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with
INTERNATIONAL ABSTRACT

Official Journal American Congress of Physical Therapy

17th Annual Session
AMERICAN CONGRESS OF PHYSICAL THERAPY
SEPTEMBER 12, 13, 14, 15, 1938
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Volume XVIII DECEMBER, 1937 No. 12

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Suite 712 — 30 North Michigan Avenue, Chicago, Illinois

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SHORT WAVE TREATMENT OF THE ENDOCRINE SYSTEM, DIENCEPHALON AND MESENCEPHALON

J. SAMUELS, M.D.

AMSTERDAM, HOLLAND

I

The endocrine system can be treated by two methods: (1) Substitution with exogenous animal products, by which the system improves rapidly but most often only temporarily, and (2) indirect or direct stimulation or inhibition of the endogenous endocrine glands themselves, through which the disturbed equilibrium is slowly but lastingly regulated by intracellular regeneration. An excellent method to attain the latter is excitation of the gland in the condenser field — short wave therapy of the endocrine system. In case dangerous or annoying symptoms appear with a disturbed equilibrium, we combine in the beginning organotherapy with short wave radiation, but for reasons to be described continue as soon as possible solely with short wave diathermy.

We differentiate between systemic and local short wave treatment. In the former case we place the body between two large condensers of about 40 x 80 cm. at an intensity of about 200 to 300 watts, and thereby expose all endocrine glands with the exception of the hypophysis, which must not be subjected to such an intensity. In addition one exercises a regulating influence on the hormonal consumers — the remaining bodily cells — which in turn affects the central organ of the peripheral hormonal producers, the hypophysis.

By local treatment we influence a dysfunctioning gland through excitation of the complementary gland or glands, or in the case of hyperfunction by stimulation of the antagonists, finally to affect the hypo- or hyperfunctioning gland itself by regulation. We never begin by treating a dysfunctioning organ directly, because the immediate effect might be one of aggravating the dysfunction, but we endeavor to exert a favorable influence indirectly. The endocrine electrodiagrams show us the way. Dausset was the first to try to cure endocrine deviations with the systemic method, with which he obtained noteworthy results. He also was the first to utilize the spectroreductometer in order to determine which of the glands showed a deviation. While in practice the determination by biologic methods of the quantitative composition of hormones of the blood, because for each hormonal test one needs 50 to 100 cc., totalling in some instance 200 to 400 ccm. per study, is complicated, difficult and costly, investigation with Dausset's spectroreductometer is exceedingly simple and reliable. It further affords us the means of controlling the results of treatment. Many tests have shown the extreme exactness with which the figures of reduction revealed the hormonal level, that is the blood content of activators and regulators of gas metabolism.

The method has the following basis. A fold between fingers, preferably the thumb and index, is compressed with the perforated ball-pad of the cycloscope, which temporarily arrests the circulation in an area of about 6 millimeters. If this part of the tissue is observed spectroscopically with strong illumination, one sees in the yellow and the green of the spectrum two sharply defined dark stripes — the absorption stripes of oxyhemoglobin (HbO_2) — and between them an acutely defined bright yellow band (fig. 1).

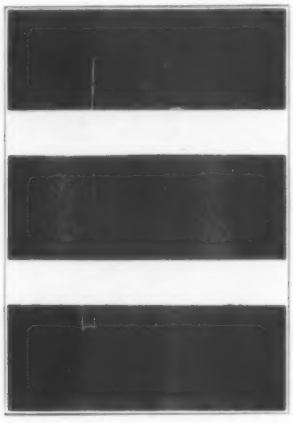

Fig. 1. — Spectra (in black and white colors).

After a while the dark stripes become dim and diffuse, finally to disappear altogether. In place of these stripes with the yellow interspace appears a wide, gray, homogeneous band. At that moment the reduction of the oxyhemoglobin is completed. The tested tissue has taken on the oxygen of the oxyhemoglobin (tissue respiration). If important conclusions are to be drawn, it is advisable to determine the figure of reduction two to three times and to take their average. Minor differences result from the inexactness of the examining eye. With some practice and experience this can be avoided so that the time can be fixed exactly to the second. It is also advisable at first to make the tests in a darkened room, where the processes are seen more clearly. After 5 to 7 seconds two new stripes appear, which are placed closer together and with a narrower yellow-green interspace. The entire picture is more diffuse and shifted somewhat to the left of the spectrum than is the case with the oxyhemoglobin stripes. These are the absorption stripes of metahemoglobin (HbO). Beginners will find it simpler for the determination of the time of reduction to wait until the metahemoglobin stripes become visible and to subtract about 5 seconds from the established time. If the picture is studied further, it will be seen that the metahemoglobin stripes again disappear, this varying (10 to 40 seconds) in different individuals. The play is repeated several times, but at a faster period. As has already been stated at the medical congress in Utrecht (1937) the determination of the time of this coming and going of the metahemoglobin stripes may prove important for the differential diagnosis of diverse diseases.

When the time of reduction has been ascertained and the compression is removed, which restores the circulation and permits the influx of new blood containing oxyhemoglobin, the above described oxyhemoglobin stripes reappear with the wide yellow band between them. It is advisable to change the place of compression if one desires to obtain a series of numbers. This is accomplished by making a sketch of both hands and by drawing small circles for the new places of compression.

The time of reduction in healthy, normal men and in women of a postclimacteric age, whose endocrine system otherwise is in a state of equilibrium, amounts to about 145 seconds. In women of a sex-ripe age the reduction figures are subject to daily variations. They deviate from the normal period of about 145 seconds during ovulation and menstruation. Dausset did not know this, because this discovery was made by me a few months after his death. Accordingly in determining the reduction figure in sex-ripe

women it is important to take into consideration the phase of their menstrual cycle.

The figure obtained at the beginning of an investigation, that is, before the glands have been stimulated in the condenser field, is called the initial number. If we now radiate the various endocrine glands with small stimulating doses of about 40 to 150 watts, and these glands are normal, we will see that the figure of reduction after each endocrine radiation remains unchanged — about 150. A variation of about 10 seconds has no significance. We expose the hypophysis for 10 minutes to 40 watts with electrodes of a diameter of 5 cm. and a dorsofrontal electrode distance of about 30 centimeters. We direct the center of the electrodes toward the point between the root of the nose and the external occipital protuberance. We radiate the thyroid gland with about 60 to 75 watts, the ovaries and other endocrine glands with 75 to 150 watts according to the resistance and thickness of the intervening tissues.

Effects in Glandular Dysfunction

The situation is entirely different with a dysfunctioning gland, as the figure of reduction obtained immediately after radiation shows a more or less pronounced deviation from the normal. In women we obtain the figures usually in the following sequence: Initial time, thyroid, hypophysis, ovaries, mammary glands (if there is a cause for it), also the adrenal and the pancreas. The resulting figures are arranged diagrammatically, as is shown in figures 2 and 3. The picture thus obtained is called the endocrine electrodiagram.

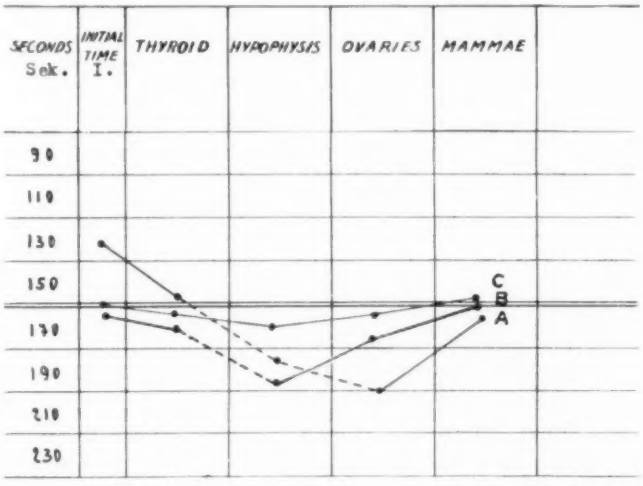

Fig. 2. — Endocrine electrodiagram of primary amenorrhea. Diagnosis Nov. 18, 1936: Dysfunction of hypophysis and ovaries (hypofunctional disturbance). A = diagram of Nov. 18, 1936; B = diagram of Jan. 3, 1937; C = diagram of Jan. 19, 1937.

Study of this diagram facilitates the diagnosis, the determination of therapy and of the progress and improvement gained by short wave and also organotherapy. In this manner we also analyze the endocrine system. If the figures found after radiation deviate essentially from the normal, we are facing dysfunction. But one cannot as yet determine from these figures whether one has to deal with a hypo- or hyperfunctional disturbance, something that is important to establish for therapy.

A simple method to recognize the kind of deviation for example in a hypophysis, is to radiate its antagonist, the thyroid gland, with a strong dose

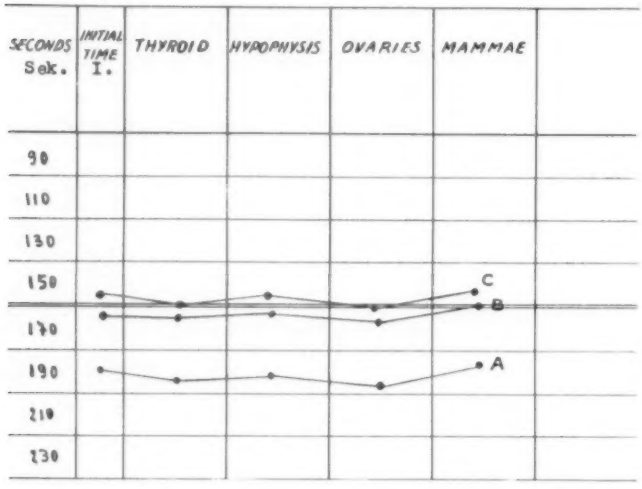

Fig. 3. — Primary amenorrhea (continuation of fig. 2.). Three normal diagrams: A = diagram of Jan. 31, 1937, taken of patient 1 day before menstruation, in equilibrium with numbers at 180; B = taken Feb. 8, 1937, a few days after menstruation; C = normal diagram of March 19, 1937.

of about 100 to 120 watts two days after the first examination. If the hypophysis figure shows a pronounced deviation, there is practically always hypopituitarism; if the deviation is less pronounced, we have hyperpituitarism. One may also undertake a quantitative biologic investigation. Most often the symptoms indicate whether we have to deal with a hypo- or hyperfunctional disturbance. If by none of these means we can obtain a result, we radiate the dysfunctioning hypophysis irrespective of the kind of deviation. It is possible that the symptoms become aggravated in hyperpituitarism — which points to hyperfunction — and gradually abate because the gland becomes regulated.

Dausset's method at first consisted of treating the glands that approximated the normal, and to leave those that deviated from the normal severely alone. This method has not proved correct, especially in hypofunctional disturbances. After Dausset's death I continued his investigations and reached noteworthy results, diagnostic as well as therapeutic. It was demonstrated that in numerous disturbances the hypophysis, the mid- and interbrain were primarily diseased. This was shown both by the electrodiagram and the results of treatment.

In the systematic method of treatment we make a difference between hypo- and hyperfunctional disturbances. In hypofunctional affections we begin with general radiations between large electrodes or in Dausset's solenoid, which is a sort of d'Arsonval coil field that can be regulated. After about eight days we alternate the general radiations with those of the hypophysis, irrespective whether the central organ is normal or manifests a hypofunctional disturbance. Finally when the hypophysis figure has improved, that is a shift to 150, we administer in addition to the general and hypophyseal irradiations also the hypofunctioning gland or glands until they too have attained the equilibrium.

In hyperfunctioning deviations we at first radiate the antagonist of the hyperfunctioning gland or glands, as given by the diagram. In this manner the hyperfunctioning gland is the first to be inhibited. After improvement of the figure the gland itself is treated. At the end we alternately treat the antagonist, the dysfunctioning gland (or glands) and the system.

It is not proper to radiate one and the same gland on two consecutive days.

Neither in hypo- nor in hyperfunctional disturbances must the treatment be interrupted as soon as the diagram shows an equilibrium. On the contrary treatment must be continued for some time, the duration depending on the nature and gravity of a given case.

Quite often we include irradiations of terminal organs, e. g., the uterus in cystoglandular hyperplasia, in order rapidly to bring about a regeneration of the processes in that organ produced by the morbid state. The scheme appears to be very simple, but its application through different peripheral points of attack is complicated and often varying individually. It appears that in most cases it is possible only in this manner so to stimulate the endocrine system that there will be a lasting improvement and cure, and not a mere temporary substitution. Short wave diathermy is combined with organotherapy when annoying or dangerous symptoms have to be removed or when an immediate effect is desired. Gradually the administration of organic preparations is reduced while the treatment in the condenser field is continued.

It is of importance to know the following facts:

1. We make use of the specific property of the high frequency currents in the condenser field in order to improve the nutritional state and the gas and calcium metabolism, thereby to ameliorate the vital functions of cells and tissues. In this way it is possible with this energy source favorably to influence the most hidden organs of the human body, e. g., the petrous portion of the temporal bone and even part of the brain.

2. We normalize with short wave diathermy the treated gland directly, irrespective whether we have to deal with a hyper- or hypofunction. The immediate effect of the stimulus, especially in hyperfunction, is an increase of the deviation and normalization after several treatments. For this reason it is advisable first to treat the affected gland indirectly, and only later the gland itself.

3. In radiations of hyperfunctioning glands we administer smaller doses more carefully than we do in hypofunctional ones.

4. By the administration of exogenous hormones we obtain a rapid substitution, which may prove of great significance for our therapy, but it should not be overlooked that in hypofunction the concerned gland and the hypophysis are inhibited by organic preparations through a resulting atrophy due to inactivity.

5. This explains why with the exclusive use of exogenous hormones the equilibrium in the periphery can be rapidly restored, but the deviation of the endocrine gland is not cured and on the contrary is increased in its dysfunction, which in turn compels a continuation of exogenous substitution (opotherapy).

6. The cells of the endocrine glands are not only producers but also consumers, so that they are likely to be affected by hormonal disturbances of other glands.

Role of the Hypophysis

For the evaluation of the endocrine system it is important to know the state of the hypophysis and its environment. An insight in these deviations is gained only when one knows that there are numerous important centers and tracts in the di-and mesencephalon. They are the center of all peripheral endocrine glands, especially the producer of the gonadotrope, diabetogenous, thyreotrope and the probably existing growth hormones; the central regulator of gas-, fat- and calcium metabolism, respectively of water, salt, car

bohydrate and albumin consumption; the place of control of the vegetative (parasympathic) tracts of the stomach, intestine, lungs, heart, liver and kidneys; the trophic centers of the stomach, duodenum, jejunum, liver and pancreas; the thermoregulating centers (probably the tuber cinereum); the cortico-cerebral, cerebellar and spinal tracts as well as the opticus, acusticus, olfactorius, oculomotorius and trochlear tracts. All these centers and tracts may be affected singly or in combination in hypophyseal diseases, especially hyperpituitarism.

With short wave diathermy we reach not only the hypophysis but also the entire diencephalon, by which there is a possibility of exerting a regulating effect on all centers and tracts.

The following cases illustrate what has been said:

Diagram 2 represents a case of primary amenorrhea, a disease which all gynecologists have declared to be incurable. So far we have failed in obtaining a cure with hormonal medication. We have to deal with a hypoplasia of the genital tracts and in addition a disturbance of the endocrine system. The diagram shows dysfunction of the hypophysis and ovaries, close examination revealing that there is a hypofunctional disturbance. This disease is essentially different from secondary amenorrhea, an affection which is easier curable, provided it has not existed longer than six months, because the genital apparatus of the woman usually is well developed in this affection. In cases of secondary amenorrhea the women have already menstruated once or several times. Accordingly we have to deal solely with an endocrine disturbance, which may be primary or secondary to another disease. In the latter case naturally the principal cause is treated first or at the same time with the endocrine disturbance. Primary amenorrhea, however, presents a double problem: (1) the genital apparatus, especially the uterus and ovaries must be developed, and (2) the endocrine system must be stimulated through the hypofunctioning glands.

In an attempt to remove a hypoplasia of the genital apparatus it should be borne in mind that it is a problem of attaining in a few weeks or months for which nature requires 13 or 14 years with small hormonal impulses. This is not a difficult matter with our organotherapeutic means. It is, however, difficult to maintain the hyperplasia that has been obtained. It was formerly believed that the uterus grows only during puberty, but we know today that it grows from the *anlage in utero*, that is from the birth of the child to and after puberty. *Natura artis magistra* (nature is the teacher of art). It is demanded of us that we accomplish this more rapidly and equally as well. It is therefore a work of art to develop an infantile organ in a few weeks or months and to cause it to function. The main mission is to take care that the hyperplastic organ should remain well developed and not become atrophic. It is to an erroneous recognition of this fact that in my opinion the failure of this kind of hormonal treatments must be ascribed.

It is an established fact that until now these deviations have not been cured. Thus Kaufman says in Stöckel's text-book: "I advise practicing physicians to abstain from treating primarily amenorrhoic women, that is, those who have never had a spontaneous menstrual flow." Clauberg says: "One has so far not succeeded in bringing about ovarian function in this kind of patients." Clauberg even draws the conclusion: "There remains nothing else for us but to regard such an inferiorly functioning ovarian complex as a malformation, and it therefore does not lie within the sense of our endeavor to correct such a state willed by nature." Kehrer in his latest book *Endocrinology for the Gynecologist* asserts: "Cyclic menstruation was not achieved. There exists an amenorrhea that cannot be influenced." Von

Rooy and Treub also are of opinion that in such cases we are powerless.

For this reason the following case of a 23-year-old girl, a member of a physician's family, is noteworthy. The retroverted uterus had a cavity shown by sound to have a length of only 3½ cm. By the endocrine method of examination it was shown that she had a hypophyseal-ovarian hypofunction (see diagram 2). The following was attained with the uterus and ovaries which did not function either subjectively or objectively:

1. The uterus was fully developed within about two months by combined organo-short wave therapy, and this development was kept up for several months. The organ spontaneously rose into anteflexion and showed after about two and one-half months a cavity length of 6 centimeters (measured by sound).

2. After about two months the endocrine system was in perfect equilibrium (see diagram 2,3). The initial figure of 120 and with it the hormonal level rose to 145-148, which means that the predominant influence of the thyroid — due to the hypofunction of the ovary — that is to say, a relative thyroidism was removed, and the hypophysis and ovaries were restored to their place in the orchestra of the hormones, which reestablished the endocrine equilibrium.

3. After six weeks appeared the first menstrual flow, which reappeared regularly in a cycle of twenty-eight days (so far already six times).

4. Finally it was definitely demonstrated that the patient ovulated on the 11th and 18th cycle days during the month the cyclogram was taken (cyclogram 4).

The diagram of this patient shows that at the beginning of the treatment on November 18, 1936 (fig. 2) the initial figure was 120, thyroid 145, hypophysis 175, ovaries 190 and mammary gland 155.

At first the patient was given general body radiation six times every other day, after which daily general and hypophyseal irradiations were alternated. At the same time we gave for six days 500 rat units of prolan, after that daily 10,000 mouse units folliculin or Menoformon-Organon, and finally for three days 5 cat units progestin. The patient was not treated on Sundays. Organotherapy was started December 1.

Toward the end of December another diagram was taken, which revealed that the ovaries were functioning much better. January 5, appeared the first menstruation, which lasted two days. January 19, the diagram revealed a still better function of the ovaries and considerable improvement of the hypophysis (fig. 2). After the first menstruation treatment with prolan, menoformon and progestin was continued, but we gave only 500 rat units of prolan six times, 10,000 mouse units of menoformon ten times and 5 cat units of progestin five times. Short wave treatments during January consisted of alternating hypophyseal and ovarian radiations. The hypophysis was exposed to an energy of 40 watts, an electrode size of 5 cm., the electrode position being root of the nose — external protuberance, electrode distance (from the metal plates) 30 cm., and treatments of about 13 minutes. For the ovarian radiations we made use of an intensity of about 200 watts, medium large and large electrodes (30x30 cm.) and an electrode distance of about 50 cm.

A measurement taken during the middle of January showed a uterine cavity of 5½ cm. Short wave treatment was given daily, one day to the hypophysis and ovaries while on alternating days we gave systemic applications alternating between the large electrodes and Dausset's solenoid, which consumed about 200 watts.

January 31, another diagram was taken. It showed that the endocrine system was absolutely in equilibrium, but it was remarkable that all figures attained a level of 180, as is seen in diagram 3. February 1, the patient had her second menstrual flow which held on until February 4. A diagram taken February 8, again showed an equilibrium of the endocrine system, but now the figures were shifted upward, at about 150 (fig. 3).

This observation led to a surprising discovery. I hit upon the idea of determining the daily reduction time of the oxyhemoglobin in a normally menstruating woman. It appeared that the figures of reduction during the cycle of a woman between puberty and the climacteric underwent typical variations, by which we were able to demonstrate the rise and fall of gas metabolism as an index of the hormonal level after menstruation and during ovulation. This was confirmed by abdominal operations.

Such a curve was given the designation "spectroreductogram of the menstrual cycle" or "Cyclogram" (fig. 4). In such a cyclogram one can recognize the following phases: (a) First menstrual drop; (b) preovular high tide; (c) first ovulation drop; (d) second preovular high tide; (e) second ovulation drop (f) premenstrual high tide. It appeared that during pregnancy the ovulation and menstruation drops do not exist. Through this constancy of the figures it was possible to make a diagnosis of early pregnancy. The figures have a range of 150-165 (in younger pregnant women the

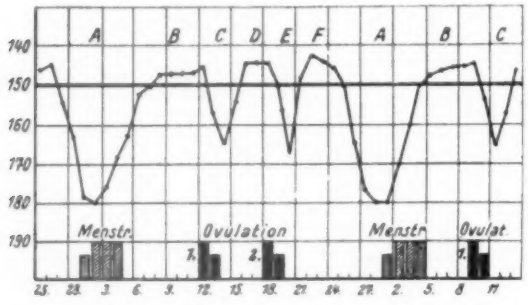

Fig. 4. — Normal cyclogram of 28 days. Note the difference in appearance of ovulation in the 1st and 2nd cycle month. In the 1st month 12 days after initial menstruation, in the 2nd month 9 days after initial menstruation; A = menstrual drop; B = preovular highest state; C = ovulation drop; D = 2nd preovular highest state; E = 2nd ovulation drop; F = premenstrual highest state.

figures are higher than in older ones), (fig. 5). I mention this important discovery solely because I accidentally hit upon it during the treatment of a patient with primary amenorrhea, but will not enter into details as they are beyond the scope of this article.

Let us return to our case of primary amenorrhea. During February and March the treatment was continued with alternating hypophyseal-ovarian and general ra-

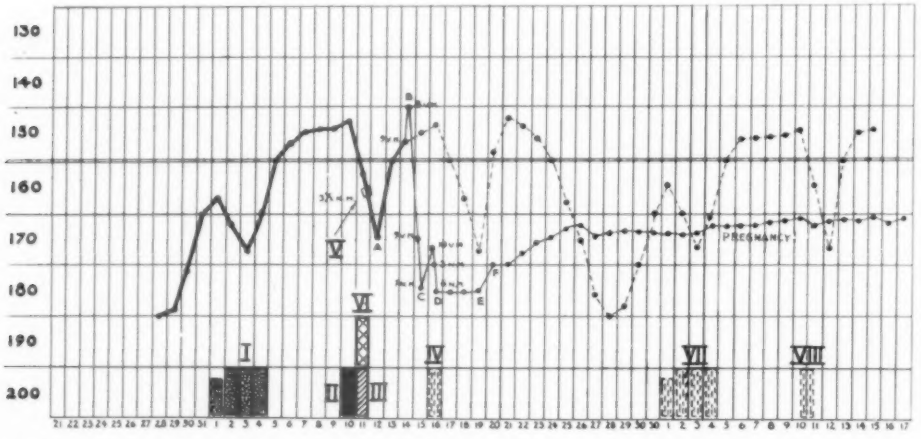

Fig. 5. — Cyclogram of a woman with a cycle of 31 days, before and after fecundation; . — . cyclogram before fertilization; . . . . . cyclogram curve of past month; . —— . cylogram after fertilization; I = menstruation; II = ovulation; III = second ovulation; IV = ovulation if fertilization had not occurred; V = copulation; VI = impregnation of ovum; VII = missed menstruation (schematic); VIII = ten days later Friendmann's reaction is positive; v.m. = before menstruation; n.m. = after menstruation.

diations to which were added 10,000 mouse units of menformon ten times and 5 cat units of progestin five times. February 23, a diagram was again taken, which was perfectly in equilibrium (fig. 3). The menstrual flow which appeared March 29, lasted to April 2, a period of five days. The cycle curve taken daily of this patient appeared as perfectly normal and also shows the same variations of ovulation and menstruation as those of all normal women (fig. 6). After April 1, she was given 500 mouse units of menformon five times and 1 cat progestin three times every month. In addition on the 8th, 13th, 16th, 22nd, 23rd, 24th, 25th, 26th and 27th day of the cycle she was given ten times per month local radiations of the hypophysis and ovaries. All told the patient so far has menstruated six times.

It is a mistake to stop the treatment too early. We must maintain the endocrine system in equilibrium and take care that the hyperplastic uterus does not again become atrophic. The course of treatment must last at least six months. Treatment must be given daily for three months and for the

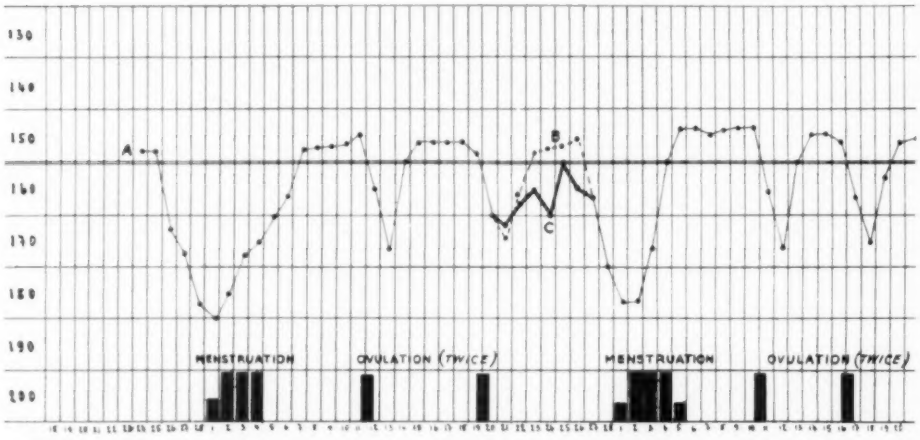

Fig. 6. — Cyclogram of the patient with primary amenorrhea. A = normal cycle; B = schematic curve (probably course if progestin had not been given); C = curve lowered through administration of luteohormone (6 times 5 cat units progestin). This cyclogram was made between the 3rd and 4th menstruation and after the last one. The course of the cycle deviates no longer from the normal.

remaining period ten times each month, as stated above. It should also be mentioned that one and one-half years ago this patient was treated by a well-known gynecologist with hormones according to Zondek without the least effect. At the beginning of the course the patient had never experienced any pains or other sensations in the abdomen and had never had a mucous discharge from the genitals. The first appearance of a mucous discharge took place after a radiation of the hypophysis, which was regarded as proof that the ovaries were functioning. At the same time she also had pains in the abdomen and the sensation that something was moving (contractions of the uterus?). At that time I had not yet found the method of demonstrating ovulations spectroscopically. If a mucous discharge appears after a radiation of the hypophysis, the symptom is to be regarded as a sort of estrum, a hyperemia of the genitals produced by the hypophyseal gonadotrope hormones, which indirectly exert an influence on the uterus and vagina by way of the ovaries. Another symptom from which it was seen that the ovaries were functioning was an improvement of the ovarian figure after radiations of the hypophysis. With the cyclogram it is today possible to determine with exactness whether a patient ovulates or not. It is important to establish before treatment the condition of the ovaries, although it is known that in primary amenorrhea they rarely are in so rudimentary a state that they do not function at all. We will virtually always diagnose a more or less pronounced hypofunction. In the extraordinarily rare cases of aplasia and completely rudimentary ovaries, respectively of an aplasia of the primordial follicle, of course any kind of treatment is hopeless.

(To be concluded in an early issue.)

EFFECT OF ULTRAVIOLET AND VISIBLE RAYS ON CARBOHYDRATE METABOLISM *

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CHICAGO

Effects of the rays of the sun and artificial light sources on animals and human beings are manifold. The metabolism may be changed greatly. This is best known for the inorganic materials, as in the increase of calcium and phosphorus for preventing and curing rickets. The same is true for the metabolism of the organic substances in the body. This paper will be restricted to a consideration of the influence of light on the metabolism of the carbohydrates.

By exposing animals to the rays of the sun or of an artificial light source emitting a certain amount of ultraviolet, we find a decrease of blood glucose, sometimes preceded by a short increase.[1] This phenomenon, which I observed on rats, rabbits and guinea pigs was confirmed by other investigators not only in animals but also in human beings.[2] The extent of change is in some way dependent upon the quality of the light, the strength of the light source, and the time of radiation. Sensitization with fluorescent dye stuffs such as eosin, erythrosin, anthrachinon derivatives strengthen the effects produced by light sources even with a small amount of ultraviolet, such as the sunlight in the lowland. Thus rabbits injected with fluorescent dyestuffs kept for some time on the roof of a building in the North European plain showed a very remarkable decrease of blood sugar, e.g. from 0.13 to 0.08 per cent. There is no difference whether these dyes are given by mouth or by injection as they spread very quickly through the whole body.

How are these results to be explained? It may be imagined that the sugar vanishes by destruction, and that oxidation takes place. No direct action on the blood takes place as Reed[3] and his collaborators were able to show that by irradiating the blood of animals through a quartz-cannula inserted in the carotid the blood sugar did not change at all. Accordingly we have to assume that the process by which the lowering of the blood sugar is effected, has to deal with the whole of the metabolism.

If the blood sugar decreases and real destruction does not occur, we have to find the carbohydrate that disappeared in the blood in another place. This may be the liver and the muscles where carbohydrates are stored as a reserve for further use. We actually find the glycogen content of the liver and muscles highly increased in animals irradiated with the quartz lamp or other light sources.[4] The carbohydrate (glucose) lost from the blood of irradiated animals is not wasted but appears in a new form as glycogen in the muscle and liver ready for later use. We know that carbohydrate (glucose) is first broken down in the body to lactic acid but that a part of the latter is resynthesised into carbohydrate. Searching not only for the carbohydrate content but also for the lactic acid in the blood, liver and muscle, we see the quotient carbohydrate: lactic acid increased; i.e. the synthesis of carbohydrate is a larger one in irradiated than in nonirradiated animals. This effect of light is very similar to that of insulin.

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* Read at the Sixteenth Annual Session of the American Congress of Physical Therapy, Cincinnati, Ohio, September 22, 1937.

* From Department of Physiology, University of Illinois College of Medicine.

Experimental Data

To confirm this relation experiments were performed to see in which manner irradiation acts on the insulin content of some tissues.[5] Guinea pigs were irradiated with different light sources for a given time (importance of quantity and quality), then killed and insulin extracted from the tissues. The extracts, corresponding to equal quantities of the tissue were tested on other animals for the effect on blood-sugar.

The difference of the insulin content of irradiated and nonirradiated animals is a very obvious one and depends in a high degree upon the quality and quantity of the radiation (figs. 1, 2).

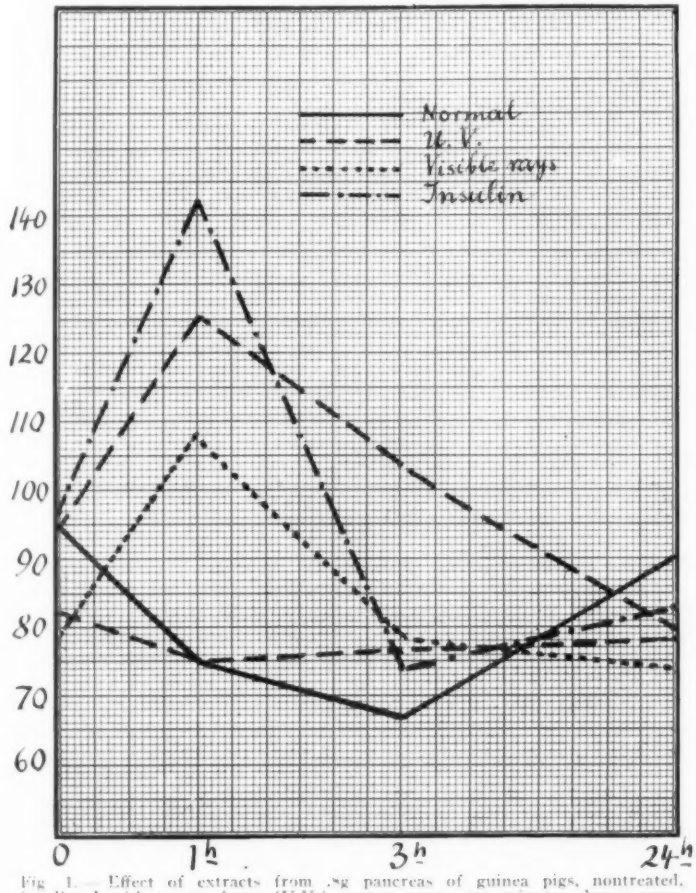

Fig. 1. — Effect of extracts from .5g pancreas of guinea pigs, nontreated, irradiated with quartz lamp (U.V.), upper curve, ten minutes, lower curve 60 minutes, with incandescent lamp (visible rays), injected with 10 units insulin on the blood sugar.

It is apparent that the extracts from animals irradiated with ultraviolet give different curves whether the irradiation lasted 10 minutes or 60 minutes. The upper ultraviolet curve in figures 1 and 2 shows the effect of the extracts from animals irradiated for 10 minutes, the lower curve that from animals irradiated 60 minutes.

The difference is quite obvious: a big increase in blood sugar 60 minutes after administration of the tissue extracts of guinea pigs irradiated for 10 minutes, an effect very similar to that produced by the extracts from insulin injected animals, while the extracts from animals irradiated for 60 minutes show little or no effect.

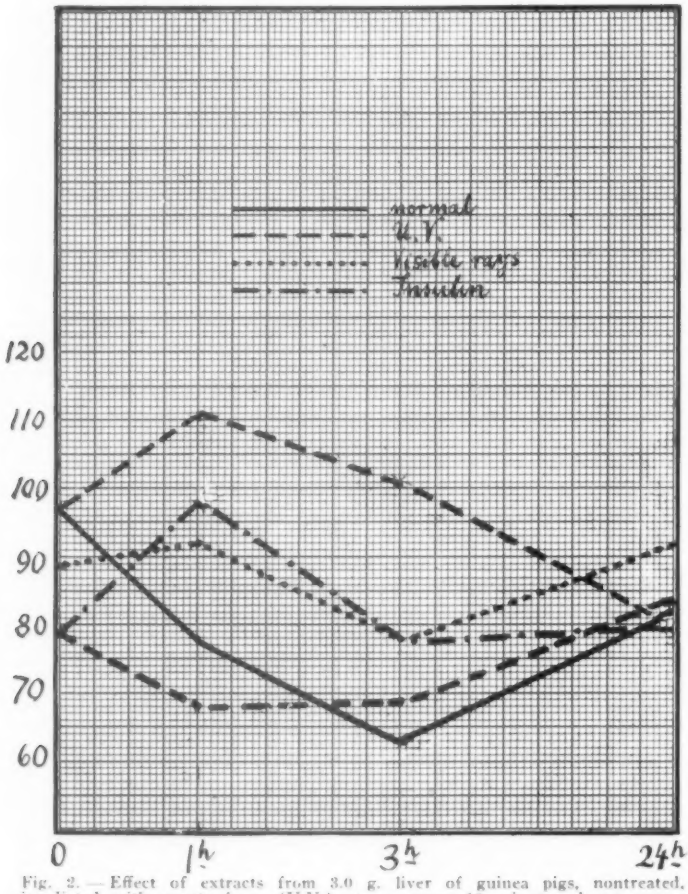

Fig. 2. — Effect of extracts from 3.0 g. liver of guinea pigs, nontreated, irradiated with quartz lamp (U.V.) upper curve 10 minutes, lower curve, 60 minutes, with incandescent lamp (visible rays), injected with 10 units insulin on the blood sugar.

The extracts from normal animals (neither irradiated nor insulin injected) give the characteristic insulin effect. By irradiation with visible rays extracts are obtained which give a different blood sugar picture, but in some way similar to the curve produced by the ultraviolet extracts.

The manner in which the extracts of animals treated with the same light source act on the blood sugar is qualitatively similar for all the tissues under consideration.

How differently colors (wavelengths) used for irradiation act on the blood sugar and the lactic acid of rabbits, is shown in figure 3.

There is a great difference between ultraviolet on one and red on the other hand,[6] while irradiation with blue and green gives curves between those extremes. That the difference in light is of greatest importance for the carbohydrate metabolism appears from experiments in which rats, kept on the same diet, were exposed to ultraviolet and visible rays four hours daily for some weeks. Two light sources were used in these experiments, a Hanovia lamp emitting virtually ultraviolet rays only, and an incandescent lamp of high efficiency. The radiations from these lamps were applied in such a way that the total energy was the same in all cases. In one of the series ultraviolet alone was used for irradiation; in the second series 1 part ultraviolet combined with 2 parts incandescent radiation; in the third series 1 part ultraviolet and 9 parts

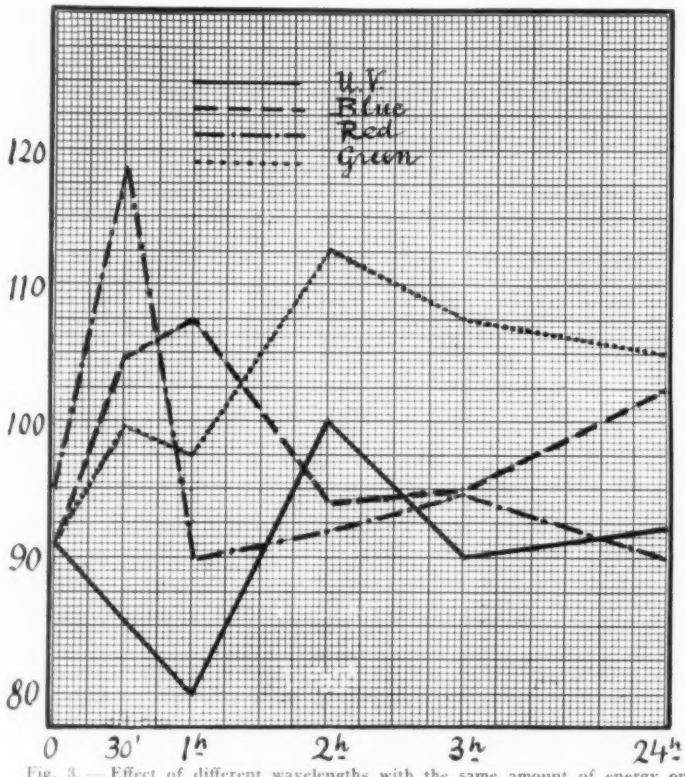

Fig. 3. — Effect of different wavelengths with the same amount of energy on the glucose in the blood of rabbits.

incandescent rays, while in the fourth series the incandescent lamp alone was used.[7]

From table 1 it is evident that the highest content of carbohydrate and the highest quotient carbohydrate: lactic acid appears after application of 1 part ultraviolet and 9 parts incandescent light. Thus for the best effect a small quantity of ultraviolet and a large one of visible rays including infrared is necessary. It seems that light sources fulfilling these conditions and very similar to the sunlight will be the best for the needs of carbohydrate metabolism to prevent waste of carbohydrates and increase the storage of these substances in order to maintain the power reserve in the body under normal and emergency conditions.

TABLE 1. — *Selected Radiation with Ultraviolet or in Combination with Incandescent Rays.*

Irradiation with	*Blood*			*Liver*			*Muscle*		
	Glucose	Lactic acid	Quot	Glycog.	Lactic acid	Quot.	Glycog.	Lactic acid	Quot.
Quartz Lamp alone	74 mg %	9.9 mg %	7.5	2760 mg %	55.3 mg %	49.8	500 mg %	177 mg %	2.8
Quartz Lamp 1 part Incandesc.—L. 2 parts	75	11.0	6.9	2780	54.0	52.0	504	168	3.0
Quartz Lamp 1 part Incandesc.—L. 9 parts	100	9.4	10.6	4487	66.0	68.0	563	150	3.8
Incandescent Lamp alone	71	6.2	8.5	2776	56.0	50.0	475	168	2.8

While these experiments were performed on normal animals, the same is true in abnormal alterations of carbohydrate metabolism, as in diabetes. Of course it is not possible to demonstrate in human beings the carbohydrate changes in the liver and muscles. But I[8] was able to show that in diabetics the high glucose level in the blood may be lowered by irradiation with a mercury quartz

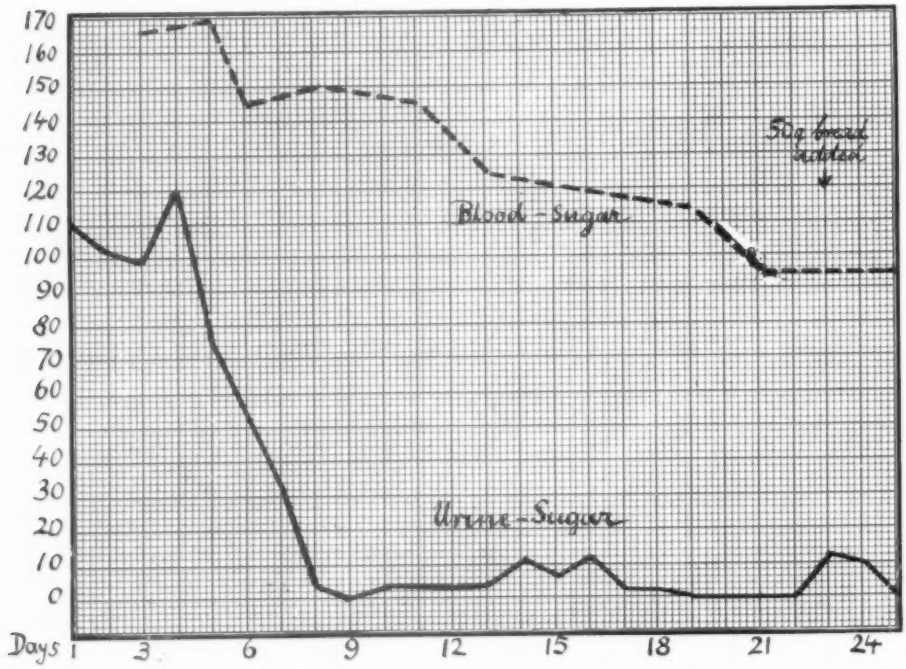

Fig. 4. — Diabetes mellitus; hospital diet with 120 g. carbohydrates daily; from fifth day irradiated daily by incandescent lamp of high efficiency after administration of .25 g. eosin.

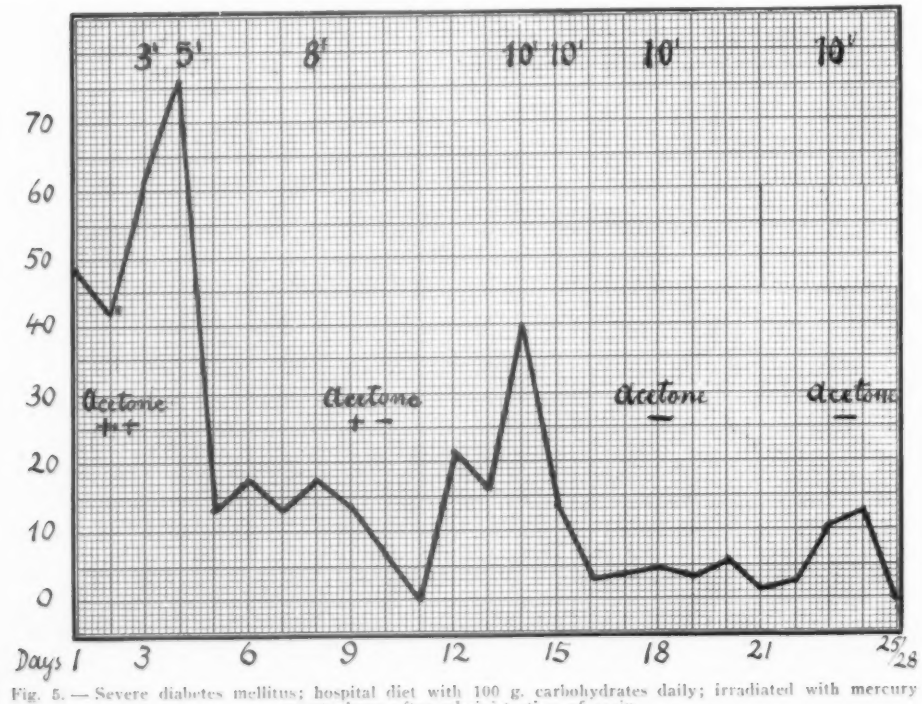

Fig. 5. — Severe diabetes mellitus; hospital diet with 100 g. carbohydrates daily; irradiated with mercury quartz lamp after administration of eosin.

lamp (fig. 4). Identical results were obtained by irradiating patients with other light sources after having administered fluorescent dyestuffs, such as eosin and the like (fig. 5).

At the same time the glucose content of the urine decreased, and disappeared completely in some cases. The amount of acetone bodies dropped, so that there is no question that the whole change is due to the same mechanism, a shift in the carbohydrate metabolism produced by the effect of radiation.

The same as shown for the experiments on normal subjects is true for the effect on diabetics, that is to say, quality and quantity of light are of greatest importance.

In some cases irradiation did not produce any effect. This was particularly noticeable in patients with an extraordinary high output of urine (more than 6000 cc. daily). From this it may be assumed that the pituitary action played a role in these cases.

Summary

1. Carbohydrate metabolism is greatly influenced by ultraviolet and visible rays. The most obvious symptom is a lowering of the blood sugar.

2. Experiments on animals show that while the blood sugar decreases, the glycogen content of the liver and muscle increases and the lactic acid drops, so that the quotient carbohydrate: lactic acid increases. Accordingly the action of rays is similar to that of insulin. The carbohydrate that disappeared from the blood is stored as glycogen in the tissues.

3. For the effect of radiation the quantity and quality of the rays applied is important. Different wavelengths act in different ways. The amount of glycogen in the liver and muscles of irradiated animals depends upon the combination of ultraviolet and visible rays.

4. In diabetic patients the blood sugar drops as in normal individuals. The glucose of the urine decreases and may vanish completely. The same is true for the acetone bodies of the urine. The effect is also dependent upon the quality and quantity of the rays. Sensitizing dyestuffs may enhance the action.

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(*For discussion turn to page 760.*)

ULTRAVIOLET IRRADIATION IN SECONDARY ANEMIA *

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The extensive literature on ultraviolet radiation shows a relative dearth of controlled clinical research in its effect on anemia in humans. There are reports of many investigations in which it was found that ultraviolet produces a change in the blood count, but according to Laurens[1] it is extremely difficult to draw any definite conclusion from them because the conditions of experimentation were too variable for comparison.

In animal experiments Graffenberger[2] reported as early as 1893, that rabbits after being kept in the dark for 30 to 40 days showed an increase in hemoglobin after return to prolonged daylight. Weber[3] showed that in dogs made anemic by injection of acetyl phenylhydrazine (pyrodin), their blood regenerated more rapidly at high altitudes than at sea level. Kestner[4] studying the effects of altitude, air pressure and radiation in artificial anemia of dogs found that only radiation — the carbon arc — had any detectable effects. This author expressed the interesting opinion that radiation either from the sun in high altitudes or by artificial sources causes the formation of some substances (possibly nitroxyl compounds) which are inhaled and act as stimulants of red cell formation. The definite effects on red cells and hemoglobin content were corroborated by American investigators, among them Laurens and Mayerson[5, 6] who produced artificial anemia in dogs by acetyl phenylhydrazine injection and by bleeding, and Foster[7] in rats with nutritional anemia.

Among the experiments on humans are those of Burchardi[8] who irradiated with the carbon arc 12 patients daily for three months and comparing their picture with 83 controls found a small increase in hemoglobin and red cells. Spence and Griffith[9] irradiated tuberculous patients with the quartz mercury arc and found a slight effect on the red cells and hemoglobin as well as a definite increase in the number of white cells. Sanford[10] used the mercury arc in 200 newborn infants and found irregular results, but best effect in those who had a low initial hemoglobin count. Hoeffel and Lyons[11] on a study of 40 children found that ultraviolet and other radiation had no specific effect on the blood. Laurens takes it as proved that under light therapy favorable results may be obtained in primary and secondary anemia. Although it is admitted that it is an adjunct and not a specific, it brings about improvement more rapidly than can be achieved without its aid.

This study presents a controlled experimental investigation of the effects of definite dosage of ultraviolet irradiation on hospitalized patients with secondary anemia. The work was carried on in two institutions on two different groups of patients — totaling 113 — and two different technics. In both series there was included a group of controls which presented the same average degree of anemia.

All the patients including the controls were on the same diet. The controls did not receive treatment of any kind during the two week period devoted to the tests. None of the patients in these groups had, prior to the test, received exposures to direct sunlight or ultraviolet radiations. None of them had received, nor did receive during the test any medication which

* This study has been carried on at the City Hospital, New York, with the aid of a grant from the Council on Physical Therapy of the American Medical Association.
* Read at the Sixteenth Annual Session of the American Congress of Physical Therapy, Cincinnati, Ohio, September 22, 1937.

would tend to activate hematopoietic organs. The patients included both sexes.

A preliminary report[12] of the first group of 59 patients treated at Montefiore Hospital was published two years ago. The findings of that report were not very definite. There was a consistent slight increase in the hemoglobin in the irradiated cases compared to the controls and a slight increase in the eosinophil cells; there was always a marked improvement in the general condition. The lack of more definite results in these cases was attributed to the following: (1) most of the patients were suffering from chronic infections of such a nature that little or no change in the blood picture could be expected while the original disease or foci remained, (2) only suberythema doses of ultraviolet were applied.

The second group of patients on which this report is based were selected and treated somewhat differently. More of the patients were suffering from acute or subacute conditions and they all received full erythema doses from the beginning.

Light Source and Technic

The light source was a quartz mercury high pressure arc lamp operated with the alternating current. One portion of the irradiation group received light from this source through a Corex D clear glass filter of 3 mm. thickness. This provided radiation with much of the very short wavelength erythema-producing ultraviolet removed. The other portion of the group received the full radiation from the quartz mercury arc lamp without filtration. An aluminum reflector was used with the burner in both series (fig. 1).

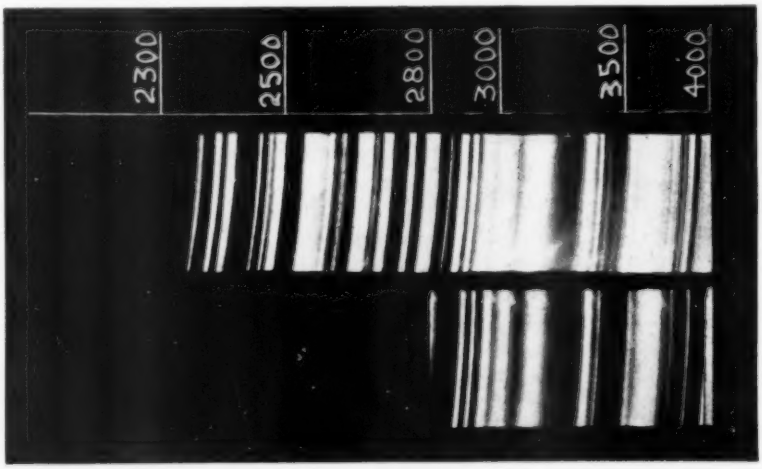

Fig. 1. — (a) Full spectrum of quartz mercury arc; (b) spectrum through Corex D. filter.

Radiation from the lamp with and without the filter was measured as shorter than 3130 Ångströms inclusive. The radiant energy in this portion of the spectrum was determined by measurement with Hanovia Ultraviolet Meter No. 1205 (approved by the Council on Physical Therapy, American Medical Association, and which had been calibrated at the National Bureau of Standards, Washington, D. C.). Proper correction was applied when measurements were made with the Corex D filter. At 36 inch distance with the filter, the intensity 3130 Å. and shorter was approximately 400 microwatts per sq. cm. (mw/cm^2). At 36 inch distance without the filter, the intensity 3130Å. and shorter was approximately 400 mwcm/^{2}. It is pointed

TABLE 1.—*Controls.*

Name	Diagnosis	Sex	Hemoglobin			Red Blood Cells—Add 4 ciphers			White Blood Cells—Add 2 ciphers		
			1st.	2nd.	3rd.	1st.	2nd.	3rd.	1st.	2nd.	3rd.
H.	Cardiac	M	64	64	62	300	310	310	76	80	92
C.	Cardiac	M	68	67	68	330	324	340	121	140	125
C.	Arthritis	F	69	68	69	345	330	335	88	84	90
F.	Arthritis	F	64	60	60	320	290	285	58	58	51
W.	Pleural effusion	F	69	66	56	335	330	275	99	110	125
W.	Anemia	F	38	39	55	212	214	280	145	160	145
F.	Arthritis	F	64	62	63	300	302	305	125	140	135
V.	Cardiac	M	70	69	70	290	295	310	94	85	92
C.	Cardiac	F	67	65	66	310	300	309	69	64	63
C.	Cardiac	F	64	63	65	300	310	314	54	51	57
McC.	Arteriosclerosis	M	57	58	64	247	250	300	116	105	90
M.	Periph. neuritis	M	69	70	73	325	340	341	51	60	90
W.	Senility	M	66	72	64	330	343	335	55	59	57
C.	Senility	M	68	64	68	330	315	333	74	70	73

TABLE 2.—*Filtered Ultraviolet.*

Name	Diagnosis	Sex	Hemoglobin			Red Blood Cells—Add 4 ciphers			White Blood Cells—Add 2 ciphers		
			1st.	2nd.	3rd.	1st.	2nd.	3rd.	1st.	2nd.	3rd.
A.	Cardiac	M	67	71	74	324	341	361	48	51	51
S.	Cardiac	M	69	71	73	341	345	340	52	54	60
L.	Cardiac	F	64	74	72	310	365	350	95	90	88
L.	Cardiac	F	67	69	72	300	330	355	52	54	55
M.	Arthritis	M	55	79	70	210	377	351	110	89	89
McL.	Peptic ulcer	M	61	74	74	274	338	340	46	87	85
S.	Arthritis	M	65	72	80	303	360	360	58	61	110
R.	Bronchitis	M	70	76	72	342	384	316	54	52	78
M.	Post pneumonia	M	58	64	71	210	274	330	115	101	98
McG.	Nephritis	M	70	71	76	330	345	360	84	90	88
R.	Drug addict	M	66	82	87	315	395	425	69	90	100
Z.	Cardiac	M	64	87	89	314	450	457	142	98	100
C.	Cardiac	M	68	70	74	336	342	362	74	80	94
N.	Arthritis	M	70	72	76	345	356	370	110	115	120
S.	Cardiac	M	58	72	83	272	388	419	43	51	90
K.	Pleural effusion	M	63	69	74	300	330	366	135	124	94
W.	Psychoneurosis	M	66	73	82	325	350	405	80	94	82
R.	Arthritis	F	66	74	74	325	365	355	66	69	70
K.	Arthritis	F	68	70	73	330	345	360	78	77	80

TABLE 3.—*Complete Ultraviolet.*

Name	Diagnosis	Sex	Hemoglobin			Red Blood Cells—Add 4 ciphers			White Blood Cells—Add 2 ciphers		
			1st.	2nd.	3rd.	1st.	2nd.	3rd.	1st.	2nd.	3rd.
G.	Post operative	F	60	79	84	276	385	415	89	75	90
R.	Arthritis	F	68	74	77	315	365	375	84	110	94
V.	Cardiac	F	69	73	81	330	350	400	124	90	84
R.	Cardiac	M	70	76	75	345	370	352	58	62	85
B.	Arteriosclerosis	F	65	69	72	321	340	355	59	59	64
K.	Cardiac	F	68	76	81	325	370	394	65	70	85
K.	Anemia	F	80	86	87	393	425	430	78	94	100
R.	Rheumatic fever	F	76	79	82	374	377	400	114	110	112
T.	Traumatism	F	69	70	76	340	346	361	95	98	92
T.	Anemia	F	56	61	75	215	300	364	66	74	83
McD.	Anemia	F	50	69	80	220	310	392	42	64	70
K.	Anemia	F	45	70	72	362	375	382	62	74	83
D.	Anemia	F	81	82	87	400	410	435	70	84	87
O'M.	Arteriosclerosis	M	62	65	75	300	315	332	65	68	69
H.	Cardiac	M	60	67	74	300	354	366	83	72	79
S.	Cardiac	M	60	60	70	310	306	331	64	66	64
H.	Anemia	F	61	72	80	290	350	392	74	76	84
D.	Furunculosis	F	68	76	84	335	364	410	68	70	81
H.	Arthritis	M	59	61	68	257	302	330	74	92	87
R.	Drug addict	M	69	81	81	303	398	333	50	43	50
McL.	Traumatism	M	58	75	77	264	320	324	74	72	74

out that the patients who received the filtered ultraviolet were also given about three times the long ultraviolet and visible light energy as compared to those who were irradiated with the complete spectrum from the unfiltered lamp.

In order to elimiaate variables, the lamp was equipped with a switch so arranged that when the filter was not used, the electrical input to the lamp could be reduced sufficient to make the unfiltered radiation for the spectral region 3130Å. and shorter as measured at 36 inches distance equal to that obtained when the filter was in use. The lamp was recalibrated and adjusted at intervals of several months to compensate for depreciation of the burner

One treatment was given each day per person for six successive days each week. The timing was the same whether the individual was in the "group with filter" or in the "group without filter." Treatments began 3 minutes on one side, a total of six minutes, and were increased ½ minute per side each day until a maximum total of 10 minutes was reached. (5 minutes per side.)

A total of 54 cases were observed, 21 of which received the full lamp spectrum (complete irradiation), 19 the radiation through the Corex D glass (filtered irradiation) and 14 served as controls.

Complete blood counts were taken before starting treatment and after seven and fourteen days. No late check up was taken because after the experimental period and the discharge from the hospital other factors entered which were beyond my control.

Results

Attention was concentrated to that part of the blood picture which involved the hemoglobin, the red and the white cells. The findings reported in this paper are confined to these three elements of the blood. Tables 1-3 show the diagnosis and results of the three blood counts in each patient in the three groups. Table 4 shows the summary of findings.

TABLE 4. — *Summary of Findings.*

Group	No. of Cases	Averages		Increase
		Before	After	
Hemoglobin				
Controls	14	64.0	64.5	0.5
Filtered Irrad.	19	65.0	76.1	11.1
Complete Irrad.	21	64.5	78.0	13.5
Red Blood Cells				
Controls	14	3,023,000	3,128,000	105,000
Filtered Irrad.	19	3,056,000	3,675,000	619,000
Complete Irrad.	21	3,132,000	3,723,000	591,000
White Blood Cells				
Controls	14	8750	9100	350
Filtered Irrad.	19	7950	8600	750
Complete Irrad.	21	7420	8180	760

Conclusions

1. Ultraviolet from the quartz mercury high pressure arc lamp accelerates the production of hemoglobin in the human. The rate of acceleration appears to be greater if the complete spectrum is used. Acceleration was not so great when only the longer ultraviolet through a Corex D filter was employed.

2. Ultraviolet increases the number of red cells in the human. The increase appears to be independent of the portion of the ultraviolet spectrum used.

3. Ultraviolet appears to increase the number of white cells. Individual results for white cells varied so greatly within the groups, that final conclusions must be reserved until after further experimentation.

4. The effects on the blood picture as well as on the general condition indicate that ultraviolet irradiation is an aid in the treatment of secondary anemia.*

1100 Park Avenue.

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Discussion of Papers by Dr. Ludwig Pincussen and Richard Kovács

Dr. Albert P. Mathews (Cincinnati): My relation to the discussion, I suppose, is simply to give some kind of explanation of how it happens that by allowing ultraviolet light to fall on the skin, you can change the composition of the blood, lower its blood sugar, as Dr. Pincussen has shown, and cause some kind of change in the hemopoietic tissue so that its activity is increased in the hemoglobin and corpuscular substance.

There are only two chemical changes known which can be produced in the skin by ultraviolet radiation and which are active. One, the formation of Vitamin D, and the other is the destruction of Vitamin B-2. Vitamin B-2 is destroyed by the visible spectrum, primarily the blue and the green, and the results of its destruction are noticeable in those parts of the body which are exposed to the sun. The question naturally arises whether this fall in blood sugar which Dr. Pincussen has noted and which is confirmed by other observers is due to Vitamin D or some other agency. There is no question but that Vitamin D affects directly the metabolism of the body. We have tried in our laboratory the respiration of the skin in animals deprived of Vitamin D, and after giving Vitamin D. There is no doubt that the respiration of the skin is reduced 20 to 50 per cent in animals deprived of Vitamin D; and by giving Vitamin D you can bring the metabolism back to normal. It seems to be probable that Vitamin D acts as a stimulus to the thyroid, because one finds an increase in the iodine content of the blood after the Vitamin D is taken either through the skin or by mouth.

It has been suggested by some observers that the fall of blood sugar is due to discharge of insulin. But the astonishing thing in Dr. Pincussen's experiment, if I understand him correctly, is that while you have the lower blood sugar, the organs of the body contain substances which, extracted and injected raise the blood sugar, and that is something entirely new to me, and I am not competent to pass any opinion upon it. The only substance normally in the body which is known favorably to stimulate the hemopoietic function, to produce the results Dr. Kovács has recorded, is the liver extract the active principle of which appears to be a nucleotide.

* The author wishes to thank the attending and interne staff and Dr. J. A. Lanahan, Superintendent and Dr. A. Ring, Assistant Superintendent at City Hospital for their cooperation, Dr. J. R. Lisa for the supervision of the blood counts, Miss Margaret Kearney, R.N. for the carrying out of the technical part of the irradiation and finally Wm. T. Anderson, Jr., Ph.D. for his continued and invaluable aid in light measurements and suggestions relative to irradiation technic.

Now, whether it happens that by illuminating the skin one can produce some substance in the skin, which, being absorbed (Vitamin D or some other substance), causes the liver to discharge more of that active principle and so to act on the bone marrow to produce the results recorded, I do not know. Those results, certainly, are extraordinary and very interesting, and will give rise, no doubt, to a great deal more work, so that ultimately we will be able to say definitely that when the skin is irradiated with a given wavelength, one gets certain results and may determine just what chemical substance is formed and how it acts in the body.

There has always been the problem of the reason of the redness of the blood and what happens to the blood when it absorbs the green and blue light. It is generally supposed that this absorbed energy is re-radiated in the form of heat waves. But it is quite possible that hemoglobin or oxyhemoglobin is temporarily energized by the absorption of light, such as Dr. Pincussen speaks of in connection with the action of the visible spectrum, and that might produce a definite effect in the body.

Dr. Miland E. Knapp (Minneapolis): From a clinical point of view, one thing of interest should be brought out beside the lowering of the blood sugar both in normal and diabetic patients or subjects, namely, that the dosage required apparently was very slight, and the results would not be confirmed if ordinary doses of ultraviolet were given.

As to Dr. Kovács' paper, we have long had the clinical impression that ultraviolet radiation in anemic individuals exerts a favorable effect upon the erythrocyte count and upon the hemoglobin content of the blood. However, this impression has been based almost entirely upon clinical observations, colored as they often are by our entirely laudable and natural desire to be of some assistance to the patient. The amount of accurately controlled experimental evidence to support our belief is woefully inadequate. The animal experiments of Weber, Kestner, Laurens and others are inconclusive and inapplicable to the consideration of human anemia.

This study by Dr. Kovács gives us some carefully controlled clinical evidence that ultraviolet radiation increases the erythrocyte count and hemoglobin content of the blood of anemic human beings. I wish particularly to call to your attention two points: First, the source and intensity of ultraviolet radiation as well as food and medication were maintained in all series, so that adequate comparison of results is possible. Second, full erythema doses were given to obtain these results. I believe we often lose the beneficial effect of ultraviolet radiation in many cases by giving doses too far below erythema level.

Dr. N. H. Polmer (New Orleans): In the bibliography of Dr. Mayer's book, "Clinical Application of Sunlight and Artificial Radiation," are mentioned no less than eighteen different articles by Dr. Pincussen on the physiologic effects of ultraviolet. Unfortunately, most of these were in a foreign language and available to us only as abstracts. But those of us who have read the literature on ultraviolet are familiar with Dr. Pincussen's work on protein metabolism, on enzymes, ferments and other phases of body metabolism.

I might digress a moment to tell a story which will illustrate the point I want to bring out. At a trial six witnesses were presented by the defense to prove that the defendant was insane. The State presented six medical authorities to prove that the defendant had his right senses at the time the alleged crime was committed. On the basis of six opinions pro and six opinions contra, the Court rendered an opinion that in view of the evidence presented the Court could only decide that the defendant was half-witted.

From the reports pro and contra, we perhaps may jump at the conclusion that the effects of ultraviolet are only partial and do not take care of the entire pathologic process in these two different groups of cases. Again, showing the changing thoughts of medical literature, I remember seven years ago receiving a pamphlet from a commercial house listing the group of diseases in which ultraviolet irradiation was beneficial. Among them was diabetes. The next year I attended a meeting of the American Medical Association where this same company exhibited equipment, and in the literature at that time a rubber stamp was passed over the diabetes, and the company was forced to withdraw its claims of beneficial effects from ultraviolet radiation at the request of the council of the American Medical Association.

Now it seems we will have to reverse that stand on the basis of Dr. Pincussen's work, and admit there are certain physiologic effects that take place from ultraviolet irradiation. Dr. Pincussen has pointed out that there are two different processes. There is, first, an increased mobilization of the sugar; and second, an increased oxidation of the sugar which is oxidized into glycogen and stored in the liver. Again, he showed an initial rise followed by a subsequent lowering of the sugar, and I am wondering whether the so-called contraindications appearing in previous papers against the use of ultraviolet in diabetes might not have been based upon studies of this initial rise. I would like to ask Dr. Pincussen if there is any contraindication to the use of ultraviolet radiation in cases of diabetes. I would like to ask if this impression which I gained from the literature is correct, that the diabetics may be divided into two classes, those with a small urinary sugar output may be benefited, and those with a large urinary sugar output not benefited by ultraviolet. I have read in the literature that it is not necessary to irradiate the skin, Frankel and Tissot having reported drops in blood sugar from

irradiation of the mucous membrane. In spite of the vast amount of published investigations on the influence of ultraviolet on the formed elements of the blood, there is no agreement in the results obtained by different workers. My colleague, Dr. Laurens, of New Orleans, has pointed out that this may be due in part or, he claims, chiefly to the fact that these workers use a variety of conditions, a variety of light sources, a variety of patients, sick and well, young and old, and a variety of subjects, animals and humans.

In Dr. Kovács' carefully controlled studies, there can be little doubt that changes are produced in the human blood by ultraviolet irradiation. In his first series of cases, the results were indifferent. He repeated his observations. You know Ehrlich repeated his six hundred and six times until he got the right preparation. Dr. Kovács has repeated his, using an increased amount of radiation, which gave better results. I have followed the work of Laurens and Mayerson in New Orleans, and based on their reports I have used ultraviolet irradiation in secondary and postoperative anemia with apparently good clinical results. Of course, other factors such as rest, fresh air, food vitamins, iron and liver are important and play a part. Therefore, we welcome information on what ultraviolet alone will do in secondary anemia. I am sorry Dr. Kovács could not follow through these cases in order to tell us how long these effects last.

I wish to emphasize the important clinical lessions learned this afternoon on the basis of these observations. While Dr. Pincussen and Dr. Kovács do not claim that ultraviolet is the best, the only, the most practical, and the cheapest method of producing the results obtained, they do show that definite physiologic effects can be and are produced by adequate ultraviolet irradiation. Both authors — and this is an important consideration — stressed the fact that the quality and the quantity of the radiation is important. Both have obtained better results employing the whole spectrum than using monochromatic irradiation. It seems that Nature indeed was kind to us by giving us the whole spectrum, instead of only monochromatic light.

Dr. H. J. Seybold (Toledo): I was very much surprised, and agreeably so, to hear Dr. Pincussen's work on ultraviolet radiation in diabetes. Well can I remember in this very assembly some five or six years ago when ultraviolet was said to be one of the contraindications for diabetes, and two or three or four of the men on the floor arose and substantiated that statement. Now we have a reversal of that. I am glad to learn that ultraviolet is not a contraindication for diabetes. I would like to ask Dr. Pincussen if in the use of ultraviolet radiation for diabetic patients, age and weight are taken into consideration, and if he works out so many grams of proteins, so many grams of fat and so many of carbohydrates, and then puts them on that diet. Also, when he uses ultraviolet in diabetic patients, how long he uses it, and for what length of time.

Dr. Ludwig Pincussen (closing): I may begin with the easiest question which Dr. Seybold has just asked, about keeping the diet constant. Of course, we have to keep the patient on a diet adapted to him, and so in these two cases here I had the pleasure to tell you about, I did keep the patients on a diabetes diet. I don't remember it exactly, but it was between 50 and 100 grams of carbohydrates daily, and an adequate amount of protein. A real diet was used as in hospitals for diabetic patients, and we had not any success with the diet alone. We did not use insulin at any time. Then we started irradiation, and I think you saw its results on the charts. These were hospital patients, and we kept them for some time. One of these, the first one, the blood sugar was tested, as shown on the graph, and irradiation was given every day for twenty minutes with a high-powered incandescent lamp, not with the quartz lamp. Two hours before she was given approximately four grains of eosin. The other diabetic was irradiated only in the way noted on the graph; only sometimes, and then for three, five, eight or ten minutes, and so on. Not every day. I repeat that in dosage of light the quality and quantity is of highest importance. If you give an excess of ultraviolet light, then you have no success — you have the opposite. The physician has to know how much to give the patient. It is a difficult question and it has to be decided from patient to patient and no set rules can be given.

In regard to what Dr. Polmer has said, I am glad that he, too, emphasized the quantity and the quality of light, and I may say that I never saw a case where irradiation is contraindicated. Also I never saw an increase of sugar in a diabetic who had been given irradiation too long. There may be other things that come up which are not very agreeable. For instance, if irradiation is too constant, if it is given too long, the heart may get a little out of order; but it is not very serious. For this reason I think there may be a contraindication, perhaps, in heart disease, but I am not able to judge that since I did not do special work on the effects of irradiation with ultraviolet on the heart. I hope to do that work some day, but until now I have not done it.

I am glad Dr. Mathews touched the thing which is most important in the whole problem. He is quite right when he says that the first and most important thing in irradiation by ultraviolet is the formation and activation of the sterols of the skin into vitamin D. I have the impression that the vitamin D substances play an important part. I ran some experiments about this, and I am not quite through with them, so I cannot tell you all about it. But I know that certain grains, oats, for instance, play a big role in treating diabetics. For instance, with irradiated oats we get the vita-

min D effect, and we found that by feeding these oats to young rats it prevented the development of rickets, whereas the controls did develop it. Besides this feeding of irradiated oats showed remarkable effect on the carbohydrate metabolism. I was trying this same experiment with dogs using ultraviolet irradiation, and we are seeing now what happens. From dogs which were fed with vitamin D, I extracted the liver, the pancreas and muscle. After the manner of Best, of Toronto, I made insulin-like stuff from these substances, and found after injection in rabbits the same curve I showed in the graphs. The curve did not go down, it went up. So we may be quite sure that there is a strong connection between vitamin D or vitamin like stuffs, and the whole sugar metabolism.

Dr. M. C. L. McGuinness (New York): In repeating these experiments I would suggest trying the carbon arc. We have patients who feel greater benefit from the carbon arc, patients who feel they get better effects from the ultraviolet light than from natural sunshine. Very frequently we combine the ultraviolet and infra-red with radiant light to step up the effect, but I think now that that work has been begun, Dr. Kovács might try these others and see what he gets from them.

Dr. Richard Kovács (closing): I appreciate Dr. Matthews remarks that he was unable to account for the biophysical mechanism of the effect of ultraviolet on the hemapoietic system. I refrained from expressing an opinion because that is an involved and complex problem, which we may well leave to physiologists. As to Dr. Polmer's remarks, I want to give a counterpart of his story or his experience about the effects of ultraviolet and the authorities governing their trends. My idea of the investigation of ultraviolet in anemia was stimulated by the conflicting opinions as to its effects in this condition. I was somewhat challenged by the adverse edict of the Council on Physical Therapy with reference to beneficial claims of ultraviolet in anemia, I therefore asked for a grant from this Council to investigate this matter which they kindly gave, together with their moral support, which I gratefully acknowledge. I also fully realize that a follow-up is necessary, but in a charity hospital we have no controlled out-patient department. The investigation undoubtedly needs further corroboration. I would like to have studies made in the line of continued irradiation by ultraviolet; say, instead of twelve irradiations, twenty-four or thirty-six. It is my clinical impression, that like any stimulus, ultraviolet will act only to a certain extent in a certain duration of time, and it will cease to be a stimulus after a while and the effect may be lost. If ultraviolet were given in abundance and the supply continued, and that were all that is needed, people in the tropics or the high mountains would be the healthiest races, but we know that they are not. There must be a quantitative and a qualitative limit. That is the reason we do not look with approval upon the continued home use of ultraviolet because it is not controlled. People get sick, and with these glorified results of ultraviolet before them in advertisements, they buy a home lamp with no knowledge of proven technic.

Pacific Physical Therapy Association

The regular November meeting of the Pacific Physical Therapy Association was held in the building of the Los Angeles County Medical Association, November 24, 1937, in the form of a dinner in honor of a California scientist whose intensive research has won for him international recognition.

The subject: "Recent Researches in Combating Poliomyelitis," by John F. Kessel, Ph. D., Professor of Bacteriology, University of Southern California School of Medicine.

The Round-Table Discussion was led by Leland G. Hunnicutt, M.D.

Following the dinner meeting two additional papers were presented as follows: "Radiation in Treatment of Cancer." Profusely illustrated with slides. George S. Sharp, M.D. Benj. H. Sherman, M.D., discussant. "Visualization of the Short Wave Field." Illustrated by newly developed technic. Claude E. Babcock, M.D., Instructor, College of Medical Evangelists. C. J. Breitwieser, E.E., M.S., liscussant.

Cleon W. Symonds, M.D., President, 606 First Trust Building, Pasadena.

Clinton D. Hubbard, M.D., Acting Secretary, 2304 Gage Avenue.

New York Physical Therapy Society

The stated meeting will be held Monday, December 6th, 1937, at 8:30 P.M., at the New York Academy of Medicine Building, Fifth Avenue at 103rd Street, New York.

Presentation of New Instrument

I. Scientific Session —

1. Climate to Order and 2. How Does a Town Breathe? I. Goldmerstein and Prof. Karl Stodieck (by invitation).

3. Introduction to Medical Climatology. Klaus Schocken, Ph.D., Research Assistant at the Institutum Divi Thomae, Cincinnati, Ohio (by invitation).

4. Air Conditioning for Comfort, Health and Therapeutics. Prof. C. P. Yaglou, Department of Industrial Hygiene, Harvard University, School of Public Health (by invitation).

General Discussion

II. Executive Session —

Jerome Weiss, M.D., President, 85 Buckingham Road, Brooklyn, N. Y.

Madge C. L. McGuinness, M.D., Secretary, 1211 Madison Avenue, New York, N. Y.

RELATION OF THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS TO THE STANDARDIZATION OF SCHOOLS FOR PHYSICAL THERAPY TECHNICIANS *

O. N. ANDERSEN, M.D.

CHICAGO

The American Medical Association was organized for the express purpose of improving medical education in the United States. We are all familiar with its fascinating history, and the work of the Council on Medical Education and Hospitals is too well known to need any special emphasis here. I should like, however, to review briefly the functions of this important division of the Association.

Thirty-two years ago the Council on Medical Education and Hospitals was created to raise the standards of medical education in this country. So well has it done its work that the medical schools of the United States today compare favorably with those of any other nation. Though without legal authority or power to enforce rules of any sort, its procedure in classifying schools has so fully commended itself to the profession and to the public, that most of the state licensing bodies have unhesitatingly accepted its findings and made effective its recommendations. Two years ago the Council undertook a comprehensive resurvey of medical schools, the results of which will shortly be published.

In 1920, the House of Delegates made the Council responsible also for the hospital work of the American Medical Association. Complete lists of all hospitals in the United States had been maintained by the Council since 1906. This register, revised annually, now constitutes the most generally utilized source of information concerning these institutions. It is employed by the United States Bureau of the Census, the Public Health Service, the Army and the Navy, insurance companies, corporations, and other organizations too numerous to mention. The educational functions of hospitals has been emphasized and specific approval granted to those which offer satisfactory training for young physicians through internships and residencies.

More recently the Council has responded to the demand for authentic information regarding the qualifications of specialists in certain branches of medicine. Through its approval of the various special examining boards it offers to the profession and the public a reliable means of identifying physicians who have had a satisfactory training in a specialty.

Since the Council operates for the betterment of medical education generally, it has good reason to be aware of the educational problems of the technician groups. Now the preparation of technicians in physical therapy as well as in other branches has come under the jurisdiction of the Council on Medical Education and Hospitals through the adoption of standards for approved schools.

In 1925, the American Physiotherapy Association began its campaign to improve the education of physical therapy technicians and to set standards of attainment for schools. The Association, desiring the cooperation of the medical profession, in 1930 petitioned the Council on Physical Therapy to undertake the standardization of the concerned schools. That Council

* Read at the Sixteenth Annual Session of the American Congress of Physical Therapy, Cincinnati, Ohio, September 23, 1937.

accepted but later found itself unable to properly conduct the survey including the desired program of inspection.

The following resolution submitted to the House of Delegates by Dr. C. B. Reed of Illinois, at Cleveland in 1934, and later referred to the Board of Trustees for appropriate action, clearly states what the Council's function should be as it pertains to jurisdiction over the schools for physical therapy technicians.

> WHEREAS, There is a recognized demand for qualified professionally trained physical therapy technicians in the hospitals, clinics, physicians' offices and schools for crippled children of this country; and
>
> WHEREAS, The work of these technicians is under the direction of members of the medical profession; and
>
> WHEREAS, The medical profession and the American Physiotherapy Association recognize the vital importance of establishing minimum standards of training and the inspection of training schools in physical therapy by a qualified and authoritative organization; therefore be it
>
> RESOLVED, That the entire subject be left to the Board of Trustees of the American Medical Association, with the request that it be given careful study and consideration, and, if practical and feasible, some plan for the establishment of standards, ratings and inspections of training schools in physical therapy be effected, providing that the expense of such inspection be borne by the school requesting the same.

The Board of Trustees of the American Medical Association transferred this duty to the Council on Medical Education and Hospitals, because it was organized to carry out personal inspections of schools in connection with its regular hospital itineraries.

Following the inspection of thirty-five schools by members of the staff, and the analysis of complete information concerning each, the Council was in a position to recommend minimum educational requirements. "Essentials of an Acceptable School for Physical Therapy Technicians" were adopted by the Council and passed by the House of Delegates at the Kansas City meeting of the American Medical Association, May 9, 1936.

While no special study of demand for technicians has been made, there appears to be now, more than ever, a recognized demand for qualified physical therapy technicians in hospitals, clinics, physicians' offices, and schools. The tremendous development in hospitals has led to the necessity of establishing physical therapy departments and these in turn have led to the increased demand for properly qualified technicians. The comprehensive and well financed program of the Crippled Children's Division of the Children's Bureau, which is now getting under way in every state and territory, will greatly increase this demand. While the number already trained and the annual output of graduates from the approved schools may not be sufficient to meet the present requirements, there should be permitted no lowering of the standards of training. Several years may be necessary for proper adjustments of supply and demand. The standards adopted and the publication of lists of approved schools will have a wholesome effect on the quality of technicians trained in the future to fill this need.

Wherever there is a demand for a certain type of training, be it business courses or training for medical assistants, there is sure to appear the commercial school. For years the offices of the American Medical Association were bombarded with letters from laymen and physicians asking: "Is this or that course considered acceptable?" or, "Where can I go for a good training?" No one knew just which of the physical therapy schools were adequate, not even the American Medical Association. Many schools asked for inspection of their own accord. The good ones wanted to be recognized while some of the poor ones thought they might escape scrutiny.

A number of the so-called commercial schools were included in the sur-

vey and the Council has knowledge of many that were not visited. The large tuition fees seem to constitute the principal admission requirement. Students are attracted to these schools through newspaper and magazine advertising. Most of those who seek admission are unaware that standards for approved schools exist. Frequently the advertisements or the follow-up letters contain statements implying that lucrative positions are secured for graduates. Since these schools depend on a continuous and expensive campaign of advertising, they are disposed to admit whatever candidates apply regardless of whether or not they have adequate preparation. For the same reason students may be admitted whenever they apply. In its contact with hospitals throughout the country the Council has secured abundant evidence that graduates of commercial schools as a rule are not the most desirable.

With the adoption of standards for approved schools of physical therapy and the publication of the first list in the Journal of the American Medical Association, August 29, 1936, the organized medical profession dealt a severe blow to the exploitation of this type of training by commercial schools. The first revision of the list appearing in the Educational Number of the Journal for August 28, 1937, contains the names of fourteen acceptable schools. Several other schools have made application and are in the process of making necessary changes to comply with the minimum essentials.

The Council will in the future make an annual check of schools for physical therapy technicians and reinspections will be made along with the regular itineraries of the Council's staff. In all this the Council has had the unfailing cooperation of the profession, physical therapy technicians, institutions and officials of the various physical therapy associations.

The problems arising in connection with the education of physical therapy technicians are not all fully solved, though many of them have been successfully dealt with in ways indicating that the needed leadership of the American Congress of Physical Therapy will always be forthcoming.

X-RAY TREATMENT OF INFLAMMATIONS *

ALBERT F. TYLER, B.Sc., M.D.

OMAHA

The use of radiation in the treatment of tumors has occupied the center of the medical stage to such an extent that the radiation treatment of inflammation has been neglected. There are certain advantages in this method of therapy which need to be called, anew, to our attention. Earlier in the history of radiation infections were treated in a purely empirical manner, but research has now given us a scientific basis by which to explain clinical results.

In acute inflammation only a few treatments are needed, the total dose being well below the erythema skin level. Even in patients who are bedfast the doses required are so small that they may be given by means of the ordinary bedside unit x-ray machine found in practically every hospital, or by the physician's portable machine in the home. A timely word of caution

* Read at the Mid-Western and Southern Sectional Meeting of the American Congress of Physical Therapy, St. Louis, Missouri, March 9, 1937.

is that we should keep constantly in mind the value of surgical drainage where needed, and of internal medication where indicated.

Method of Action

Butler and Woolley[1] found destruction of the lymphocytes in the membrane of infected sinuses in 48 to 72 hours after x-ray treatment. Heineke found destruction of the lymphocytes two hours after irradiation and Warthin presented unmistakable evidence of lymphocytic disintegration 15 minutes after radiation. Desjardins[2] states that this destruction of the lymphocytes liberates antibodies and other protective substances previously elaborated within the cells, thus making these substances more readily available for defense. These same investigators showed the polymorphonuclear leukocytes were not injured by the small doses of radiation used in the treatment of inflammation, but on the contrary they became more active, stimulated apparently by the antibodies liberated from the broken down lymphocytes. The bacteria are digested, the inflammatory reaction quickly subsides or becomes localized and may be evacuated by incision or spontaneous rupture. Edema is lessened by the destruction of the lymphocytes, lessening the lymphatic block and bringing about analgesia.

Types of Suitable Cases

Acne vulgaris is beneficially affected by radiation in both the pustular and the deeply scarred types. In the pustular form Ullman[3] thinks that in addition to the action on the lymphocytes and polymorphonuclear leukocytes, the x-ray acts upon the epithelial cells of the sebaceous and sweat glands diminishing their secretory activity. Oily and moist skin becomes dryer and the follicles that have been cystically dilated by engorgement with fat become smaller and begin again to produce normal epithelial cells. Our experience has shown that we get much quicker and more favorable results if we combine with the x-ray treatment nightly soap lather packs followed by cleansing with hot water and sponging with alcohol. The hair should be washed three to seven times weekly depending on the degree of oiliness. Much of the reinfection comes from neglected oily hair. Ultraviolet to strong erythema should be combined with x-ray treatment in the pustular form because of its definite bactericidal action.

The deeply scarred type of acne is greatly improved by x-radiation which softens the scars and causes them to flatten and become more pliable. The treatments should consist of about 50 per cent of an erythema dose, repeated at three week intervals, six or eight times, depending on the progress of the individual case.

Carbuncles and furuncles can usually be rendered much less painful, and rapid localization can be brought about with a consequent shortening of the period of recovery. Combination with the usual surgical procedures of removal of the "core" and hot packs is advisable.

Deep cervical infections are frequently so hard that they are mistaken for carcinoma. Radiation usually causes these infections to localize and come to the surface so they can be incised. In this respect x-ray treatment may be considered a "therapeutic test" enabling the physician to make a differential diagnosis between infection and cancer of the neck.

Postoperative parotitis is not only a very painful complication but is often fatal. Knüpper and Hummel[4] report 49 cases treated by x-ray using 190 K.V.P. 0.5 cu. 3 al filter, 150-200 r per treatment, repeated once or twice at two day intervals. Treatment was followed by reduction of temperature and resolution of the swelled gland. In 33 cases one treatment was enough, while 13 cases required two treatments. Hunt[5] reported the success-

ful treatment of twenty cases of postoperative parotitis in very ill patients with the ordinary bedside x-ray unit, giving 50 r twice daily three or four days. Pain stopped at once, swelling rapidly subsided and resolution, without surgical incision, occurred in all.

W. Haucken[6] reports the treatment of 24 cases of erysipelas without a death, using x-ray applied within a few hours of the onset of the eruption. Rapid decrease of the high fever and toxic symptoms was noted. Numerous American authors have reported similar results. On the other hand Knapp,[7] of the Minneapolis General Hospital, reports equally good results from the use of ultraviolet. Objection has been made to this agent because of the vesication produced by the treatment. Our own experience leads us to prefer ultraviolet. We use a strong erythema dose, but not enough to produce vesication. The affected area and normal skin about 5 cm. beyond the border of the lesion is treated, using black paper to cover the healthy skin. The straight edged erythema produced by the treatment is easily distinguished from a new invasion of the disease. The temperature rapidly subsides so that one or two treatments suffice. If there should be an area of progressive lesion, this can be treated at once and arrested. It seems to us that here is one instance where the proved bactericidal action of ultraviolet can be used to advantage. We have had patients who failed to respond to x-ray treatment whose process was stopped by one application of ultraviolet with the technic described above.

Kelly[8] has reviewed 40 cases of gas gangrene treated with x-ray by various authors. All of them have shown improvement following the treatment. Those who died were either moribund or succumbed to some surgical complication, such as embolism or shock. The action of x-ray in gas gangrene is thought to be due to the formation of hydrogen peroxide in the tissues as suggested by Faust.[9] He cites some experiments carried on at Stanford University in which it was found that irradiation of nutrient fluids produced small quantities of hydrogen peroxide which was fatal to protozoa. Hydrogen peroxide being quickly absorbed, the treatments must be frequently repeated. Faust used a bedside unit with the following technic: 5" S. G., 0.5 mm. al. filter, 40 cm. distance, 5 ma., 3 minutes over each area. The author fails to state the r dosage with this technic but it is such that it can be repeated several times and can be used in institutions where radiographic equipment alone is available.

Acute osteomyelitis is a surgical problem and early drainage is essential. On the other hand the later stages of the acute case and the chronic type can be benefited by small doses of x-radiation. Pain is lessened, the drainage becomes more liquod and the bacterial content is reduced due to the greater activity of the polymorphonuclear leucocytes stimulated by the liberation of the contents of the broken down lymphocytes.

Butler and Woolley[1] report the value of x-ray treatment in infections of the accessory nasal sinuses. They carried on a series of experiments on cats to determine the action of the x-rays. They found the lymphocytes were broken down within a few hours even when very small doses of x-rays were used. At the same time the macrophages became more active, stimulated apparently by the substances released from the broken down lymphocytes. The sinus membrane became thinner but retained numerous plasma cells, polymorphonuclear leukocytes and some histocytes. Fibrosis began in one week. The cilia, epithelial cells and those other than the lymphocytes showed no injury from the treatment.

After these experiments 700 cases of infected sinuses in humans were treated, of which 450 were followed up. These cases were divided into five groups:

1. Chronic infection with hypertrophic membrane.
2. Cases with polyps and cysts.
3. Atrophic types of membrane.
4. Chronic with densely fibrotic membrane.
5. Postoperative cases, unsuccessful radical surgery. Of the 450 cases, 30 per cent were entirely relieved; 55 per cent were definitely improved, and 9 per cent were helped slightly or not at all.

The best results were obtained in the patients with chronic, hypertrophic membranes, the postoperative failures ranking next. The cases with cysts and polyps gave no response. The atrophic types and chronic cases with dense fibrous membranes would scarcely be expected to show much change since the end result of radiation is fibrosis. When the disease has already produced fibrosis, the x-ray can only add to that already present.

The technic used by Butler and Woolley was 130 K. V. P., 40 cm. distance, 6 mm. al. filter, 300 r dose at intercals of 7 to 14 days. Not less than two, nor more than ten treatments were used in individual patients.

The good results obtained by irradiation of diseased sinuses can be duplicated in mastoid disease. Care must be taken in selecting cases suitable for treatment, viz: the early case with pain but without bone destruction. Bone destruction always indicates surgical intervention. Schillinger[10] reports the successful application of x-ray in the treatment of mastoiditis, which causes a change in the clinical picture in from six to twenty-four hours. This change is characterized by:

1. Lower temperature;
2. Cessation of pain;
3. Absence of insomnia;
4. Decrease in the amount of discharge, and
5. Change of the discharge from purulent to mucopurulent.

Schillinger gives the following contraindications:

1. Edema over the mastoid;
2. Destruction of the process;
3. When favorable progress does not result after one treatment;
4. Diabetes;
5. Transient edema in the region of the emissary vein (Griesinger sign) indicative of parasinus abscess or sinus thrombosis;
6. When the sigmoid sinus extends more anteriorly than usual so that it impinges on the antral region. Infection in such a mastoid threatens the sinus with abscess or thrombosis;
7. Low grade sepsis and increasing bone destruction;
8. Irritation or infection of the intracranial structures.

X-ray treatment in the various fungus diseases has been reported by numerous authors. Stewart-Harrison,[11] of the University of Zürich, reports the results in 30 cases which were confirmed by microscopic examination, 22 of which were in the head and neck, the remaining 8 in the lungs, liver, intestines and abdominal wall. Dyes[12] reports 33 cases. He combines the internal use of potassium iodide 0.5 Gm three times daily for one week, then rest one week in alternate order. Both the above authors limit surgical intervention to aspiration and drainage of localized liquified areas. Both use 170-180 K. V. P., 0.5 mm. cu. filter, giving 240 r dose daily to a total of 1200-1500 r. No radioepidermitis is produced by this treatment.

Our experience coincides with these authors except that some of the more resistant cases are treated at intervals of three weeks with a 25 per cent E. S. D. each treatment until complete resolution has taken place. Potassium iodide is given to physiologic effect instead of in fixed dosage.

We prefer this manner of dosage because of the variable tolerance in different patients.

The treatment of blastomycosis and sporotricholis is equally as successful as of actinomycosis. Some authors depend entirely on the x-ray while others combine x-ray with potassium iodide. We have used the combination treatment.

Infectious granulomata are radiosensitive but should have a full E. S. D. within a short period of time, preferably 200 r daily.

Mycosis fungoides is radiosensitive with rapid shrinking of the lesions under full E. S. D.

Negru[13] reports the results of 30 cases of inguinal lymphogranulomatosis treated with x-rays during the past eleven years. He used 300 r earlier, but later 200 r per treatment repeated at intervals of four to six weeks. Sixteen cases were cured, ten improved, three not cured and one recurred.

Pfahler and Kapo[14] advocate the use of x-ray treatment in tuberculous cervical adenitis using 130 K. V. P., 40 cm. distance, 6 mm. al. filter, 300 r dose given at intervals of seven to fourteen days. Some have cleared up after two treatments while the most resistant required ten. Desjardins[15] uses practically the same technic for tuberculous cervical adenitis but also recommends the use of x-ray in tuberculous conjunctivitis, keratitis and iritis. X-ray treatment retards the evolution of tubercles in eye conditions, the effect being greatest during the infiltrative stage of the lesions. He recommends 135 K. V. P., 4 mm. al. filter, 50-70 per cent E. S. D. at four week intervals.

Peribronchial adenopathy is favorably influenced by 200 K. V. P., 2 mm. cu. filter, 200 r dose repeated once weekly to not more than 1,000 r total dosage over one area.

In delayed resolution in pneumonia 25 per cent of an E. S. D. repeated daily three or four times is of aid in promoting resolution.

Summary and Comment

The technic useful in the x-ray treatment of infections may be summarized as follows:

1. Keep total dose below E. S. D.
2. Give 50-100 r daily.
3. For cutaneous lesions low voltage technic.
4. For deep seated lesions high voltage technic.

We are justified in presenting the following conclusions:

1. X-ray is a valuable aid in the treatment of infections.
2. The x-rays should be combined with medicine and surgery as indicated.
3. Acute infections require a small dose repeated frequently.
4. Chronic conditions require larger doses repeated at longer intervals over longer periods of time.
5. The effect of x-rays on infections is now definitely established as due to the antibodies released by the breaking down of the radiosensitive lymphocytes.

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Discussion

Dr. Oscar Zink (St. Louis): First I want to thank Dr. Tyler for his very comprehensive review of the value of x-ray therapy in the various infections that he listed. But here I also want to sound a note of warning. Probably from the beginning of his paper, or even during the entire presentation, one might have gotten the idea that x-rays should be included as a therapeutic armamentarium of every practitioner. X-ray therapy is still risky, and I do not believe it should be in the hands of anybody except a competent radiologist who knows of its dangers and knows how to circumvent them. The best results are obtained in those infections where there is extensive wide blood cell infiltration. The theory expounded by Dr. Tyler as to the modus operandi of the effect in infections is logical, and I do not have a better one to supplant it. It is generally conceded that the mechanism is approximately that, but in infections the polymorphonuclear infiltration exceeds the lymphatic. We know that it is because of the disintegration and release of the substance, due to its action, and the action in turn in stimulating the polymorphonuclear infiltration. Be that as it may, we do know that small doses of x-ray therapy in various types of infection do help, and we only vary in the opinion as to whether the doses should be unfiltered or how much filter we should use. But if our end result is the same that is more or less of a personal equation.

In erysipelatous lesions one probably sees most outstanding effects, especially when they are small. If the lesion is larger, be sure to include all of the periphery. Some workers advocate unfiltered radiation and others use one or two millimeters of aluminum. I personally like the latter, and it is the one we have used. The radical excision of a carbuncle harks back to the old ages. Occasionally it is necessary, but is not a routine procedure. If seen early there is a fair chance of aborting a few. In others certainly the spread is limited, and within six to eight hours and sometimes in less time pain is definitely decreased and drainage is increased. I do not mean to say that incision of a pointed area should not be made. I think surgery has to be included, but I do not think that radical surgery should be carried out.

I agree with the essayist in most of his exposition and his listing of the various inflammatory processes for which he has advised x-ray. I should like to ask Dr. Tyler whether or not the readings he gave us are actual readings or whether they are readings with the facts scattered. I should also like to know whether or not these small dosages of x-ray that he suggested, with a portable machine, were done as unfiltered or filtered radiation.

There is one other thing that comes to my mind at the time, in which I think x-ray plays a very important part, and that is lesions about the face and lip and mouth, that are tremendously dangerous and unfortunately are not considered so by the average physician. When one sees thrombosis, the danger is appreciated. These lesions are amenable to radiation. In the services at Barnes and St. Luke's Hospitals all of the acute infections are sent to the x-ray department.

ULTRAVIOLET IRRADIATION OF ERYSIPELAS IN INFANTS *

SAUL STARR, M.D.

BROOKLYN

The first report[1] on ultraviolet therapy of erysipelas in infants and children at Kings County Hospital was published in March, 1934. At that time we had studied only 51 cases, of which 23 were infants under one year of age. For comparison we used 101 serum treated children, of whom 55 were infants under one year of age. Our observation showed much better results with light therapy—a lower total morbidity and mortality rate than with serum therapy.

A series of 23 infants treated with ultraviolet, although a fairly large consecutive series of infantile erysipelas, is still a small group on which to base any conclusion. For this reason we are presenting our results to date, particularly in the group under one year of age. We are likewise presenting in greater detail our dosage technic.

Erysipelas In Infants Under One Year of Age

Sixty-seven infants, representing over 85 per cent of the admissions with infantile erysipelas, received serum therapy from August, 1928, to August, 1932. Of this group only 56 cases will be considered as having had adequate serum therapy—10 c.c. intramuscularly every 12 to 24 hours until rash and fever subsided.

From August, 1932, to August, 1935, ultraviolet therapy alone has been used at Kings County Hospital. During this time, 94 infants with erysipelas were admitted; of these, 4 died before treatment was instituted. The remaining 90 infants were divided into two groups; namely, one of 66 cases given what we now feel is adequate dosage, and another of 24 with inadequate dosage.

Our purpose is to compare results in both series, showing once more that utlraviolet therapy alone gives better results than serum therapy. It will be felt by some that our two series are not comparable, since they represent treatment in different years. Our belief, however, is that erysipelas does not change in severity from year to year. So-called "mild years" we feel are due to earlier treatment in older infants, "severe years" to late treatment and a greater number of infants under four months of age. Furthermore, the alternate case study would be futile, since a total of only 25 to 35 infants are admitted annually with erysipelas, each case varying in age, period of illness before treatment, and complications. A division of these cases by alternate administration of ultraviolet light and erysipelas serum could hardly be an even one.

The mortality rate for the 56 infants given adequate serum therapy is 60 per cent. Of the 34 deaths, three were due to complicating, unrelated factors such as pneumonia or toxicosis long after the erysipelas had cleared; eliminating these, the corrected mortality rate becomes 51.7 per cent. The total morbidity of the twenty-two recovered cases is 9.2 days. Since the average length of illness before admission and treatment is two days, the hospital morbidity is seven days for these infants.

Of the 66 infants receiving adequate light therapy, the total mortality is 27 infants, 40.9 per cent. The corrected mortality rate is 31.8 per cent. The total morbidity of the recovered cases in this group is 7.7 days, the hospital morbidity about five and a half days. All figures represent significant benefits

* From the Pediatrics Services at Kings County Hospital — Long Island College of Medicine Division, Paul L. Parrish, M.D., Director, and the Kings County Division, Geo. Brockway, M.D., Director.

over an accepted, although clinically discredited by many—standard form of therapy for infantile erysipelas.

Table 1 shows the comparative results more graphically.

TABLE 1.—*Comparison of Serum and Ultraviolet Therapy in Infantile Erysipelas.*

Therapy	No. of Cases	No. of Deaths	Corr. Mortality	Total Morbidity
Serum	56	34 = 60%	51.7%	9.2 days
Ultraviolet	66	27 = 40.9%	31.8%	7.7 days

A consideration of "ideal cases" treated within forty-eight hours of the onset of the disease, shows still more striking results. Thirty-four such cases were treated with serum; 18 died, a mortality rate of 52.9 per cent. The corrected mortality was the same. This high mortality rate existed, it must be pointed out, despite the fact that treatment in this group was instituted on an average of one day after the onset of the disease. The total morbidity of the recovered cases was 6.8 days, or 5.8 days after treatment.

Forty-one ideal cases received ultraviolet treatment on an average of 1.5 days after the onset of the disease. Fifteen died, a mortality rate of 36.5 per cent. The corrected mortality rate was still lower, 29.2 per cent. The total morbidity of the recovered cases was 7.2 days, or 5.7 days after treatment.

It might be of interest to know what benefit there is in early treatment, as in these "ideal" cases, compared with late therapy. Table 2 shows that late therapy with ultraviolet gives poorer results than the corresponding treatment given earlier. With serum therapy, earlier treatment does not have any effect on the mortality rate, although it shortened the period of morbidity of the few cases that recovered. The assumption we are forced to make is that serum has very little effect on infantile erysipelas.

TABLE 2.—*Comparison of Results With Early and Late Therapy.*

Type of Therapy	No. of Cases	Days Before Treatment	Total Morbidity	Mortality Rate	Corrected Mortality
		"Ideal" Cases			
Serum	34	1	6.8 days	52.9%	52.9%
Ultraviolet	41	1.5	7.2 days	36.5%	29.2%
		Late Treatment			
Serum	17	5.6	11.2 days	70.5%	52.9%
Ultraviolet	21	5.6	8.5 days	47.6%	38.0%

Comparison of Results

An analysis of the groups by age in months reveals some rather significant facts as to the mortality rate variations in infants. With serum therapy it will be seen from table 3 that the mortality rate is well over 50 per cent until nine months of age, while for the last trimester it is 31.2 per cent. With ultraviolet therapy, only in the first trimester is the mortality rate over 50 per cent; in the second trimester it is 30, in the last period, 11.1 per cent. Clearly, ultraviolet therapy brings with it a definite decrease in mortality for the infants over four months of age.

TABLE 3.—*Comparison of Results in Infants of Various Age Groups.*

Age	SERUM			ULTRAVIOLET		
	No. of Cases	Deaths	Mortal.	No. of Cases	Deaths	Mortal.
1-4 Mos.	27	17	62.9%	28	19	67.8%
5-8 Mos.	13	11	84.5%	20	6	30.0%
9-12 Mos.	16	5	31.3%	18	2	11.1%

Under that age the mortality rate for both the serum and the ultraviolet treated cases is approximately the same, 62.9 and 67.8 per cent respectively. For the infants under four months of age it would seem that a combination of both forms of therapy along with early and routine transfusions would be advisable.

Considering that our study embraces four years of serum therapy followed by three years of ultraviolet therapy, it might be of interest to note the annual mortality rates (table 4). In doing so we have not taken the calendar year as the basis, but have made July the dividing time, since at that season there are fewest cases of erysipelas.

TABLE 4.—*Annual Mortality Rates.*

Serum Therapy Year	Cases	Mort.	Corr. Mort.	Days Morbidity
1928-29	10	60.0%	60.0%	6.3
1929-30	10	70.0%	70.0%	9.0
1930-31	18	55.0%	38.8%	10.5
1931-32	18	55.5%	50.0%	9.2
Ultraviolet Irradiation				
1932-33	17	29.4%	17.6%	8.4
1933-34	35	48.5%	45.7%	6.7
1934-35	14	35.7%	14.2%	8.7

It is evident at a glance that the mortality rates for the years during which serum was used never reached the low values of the years when ultraviolet alone was being employed. The high mortality rate in 1935 was due to the great number of deaths in the cases under three months of age. Such infants, we have shown, receive very little benefit from ultraviolet therapy.

It is very difficult to present comparative statistics on the number of complications. In table 5 we have considered the four most common complications excluding otitis media, i.e., local abscesses, pneumonia, sepsis, and toxicosis. It will be noted that the series receiving ultraviolet therapy showed a slightly higher percentage of complications than the serum treated group. However, if due consideration is given that a greater number of infants survived under ultraviolet therapy, this will be easily understood. A more important conclusion to be drawn from the figures (table 5) is that under ideal conditions for both serum and ultraviolet therapy the number of complications is diminished.

TABLE 5.—*Complications of Erysipelas with Serum and Ultraviolet Therapy.*

		No. of Cases	Abscess.	Pneu.	Sepsis	Toxicosis	Total Complic.
Serum	Total Group	56	14.2%	23.2%	8.9%	5.3%	51.7%
	Ideal Group	34	8.8%	17.6%	5.8%	8.8%	41.7%
Ultraviolet	Total Group	66	15.1%	16.2%	10.6%	15.1%	57.5%
	Ideal Group	41	9.7%	12.1%	12.1%	14.6%	48.7%

Dosage

The dosage of ultraviolet irradiation has been rather high, and has not been diminished for the smaller infants. A mercury vapor quartz lamp, with a new or relatively new burner, which gave a mild erythema in about thirty seconds at thirty inches distance, was set ten inches away from the area to be treated, and an exposure of six minutes was given. Approximately this represents 108 erythema doses to each treatment. We have never measured the dosage accurately as a definite number of erythema doses since our lamps are in constant use and would have to be checked very frequently. However, such dosage in units is important to know when it is necessary to use lamps of different power.

We have never seen any ill effects that could definitely be ascribed to this

dosage, even when large areas were treated. A few of the infants have received an eight minute dose at this distance without any harm. If the entire trunk, front and back, is involved, it would be better policy to treat part of the area—an actively spreading portion—with full dosage rather than divide it into three minutes to the front and three minutes to the back, as we have done in some cases. If the radiation is given front and back, it is done without worry about overlapping. An effort is made to treat the entire lesion along with one to two inches of normal skin beyond it. In many cases some of the diseased area has not been exposed to irradiation; such cases responded as well as others where complete exposure was accomplished. It must also be admitted that a few cases treated at the very onset of the disease, when the involved area was small and easily irradiated, the activity persisted despite daily doses—and despite repeated transfusions—until the whole body was covered and death ensued.

The same full dosage is given three days in succession to all patients despite the clinical course. If the disease is still active at the end of this treatment, full dosage is continued daily. One case received nine successive doses without any ill effects.

It has been frequently stated that a single dose of ultraviolet will often cause an immediate response—a stoppage of spread and a crisis within twenty-four hours. We have seen this most frequently in older children where the disease runs a much shorter course; we have seen it happen frequently where there was no therapy instituted. In infants, however, erysipelas spreads over greater areas and for a longer time. It is unusual to see anything more than perhaps a slowing of the spread over the body until the temperature falls by crisis or lysis four or five days later.

It may be felt by some that such dosage is unnecessarily large, if not actually dangerous. As stated above, we have seen no ill effects from the therapy. In only one case could we possibly connect the death with the irradiation—a toxic infant with facial erysipelas which died seven hours after the first treatment. We consider any dosage less than the one employed as unnecessarily small and actually inadequate.

Over the three years of our study there were 24 cases that received smaller doses of irradiation for various reasons. Seventeen of this group died.

One particular series in this last group receiving inadequate dosage deserves comment. In 1935, all infants admitted from February to May were given one-half our standard dosage: three successive doses of three minutes at ten inches. Of the 12 infants receiving this dosage, 9 died—a mortality rate of 75 per cent. The corrected mortality rate was 50 per cent.

During that year 14 infants were treated with our usual dosage; only 5 of them died,—a mortality rate of 35.7 per cent. The corrected mortality rate was 14.2 per cent (table 6).

TABLE 6.—*Ultraviolet Therapy in 1935: Comparison of Full and Half Dosage.*

	No. of Cases	No. of Deaths	Mortality Rate	Corrected Mort. Rate
Adequate dosage	14	5	35.7%	14.2%
One-half dosage	12	9	75.0%	50.0%

In the group with half the standard dosage, there were 5 deaths in the 7 infants over four months of age; yet in the group with standard dosage there was but one death in the 9 infants over four months of age. Both groups were much alike in age distribution and in early institution of treatment. The difference between the corrected mortality rates of 50 and 14.2 per cent we feel is most significant and justifies us fully in our usage of the higher dosage.

Infants One to Two Years of Age

Analysis of the infants between one and two years of age reveals how very different erysipelas is in this age group when compared with infants under one year of age. Under both serum and ultraviolet therapy the course is shorter, the mortality less. In the last six years we have had 40 infants of this age group admitted to Kings County Hospital. Three received insufficient serum treatment and are excluded from the analysis; one of the deaths is among this trio. Three of the other 4 deaths were in Mongol idiots.

Fifteen older infants were treated adequately with serum between 1929 and 1931. There was one death in a Mongol idiot, a mortality rate of 6.6 per cent. The total morbidity of the recovered cases was 10.4 days.

In the three years since 1931, twenty-two older infants were treated with ultraviolet as above described. The total mortality rate was higher, three deaths—14.2 per cent. Two of the 3 deaths were in Mongol idiots; the third was treated ten days after the onset of the disease. The total morbidity was shorter for the ultraviolet treated cases—6.4 days.

Considering "ideal" cases as those treated within forty-eight hours, we have a group of 6 treated with serum. The average morbidity period for this group was 8.4 days; there were no deaths. Of the 20 "ideal" cases treated with ultraviolet, the morbidity period was 5.7 days. There were two deaths—the two Mongol idiots—a mortality rate of 10 per cent.

Statistically, therefore, ultraviolet therapy would seem to show a higher mortality rate but a shorter morbidity period. However if the Mongols in both groups were eliminated from consideration, the mortality rates would be very low and practically identical in both instances.

Comment

A study of the results of therapy in infantile erysipelas must be closely correlated with the age group. For children over two years of age, erysipelas is a relatively benign major illness, even more so than lobar pneumonia. The mortality is small. The child is ill for about a week and complications are few. In this group ultraviolet has definitely resulted in a shorter morbidity period than serum therapy.

In older infants, from one to two years of age, the disease takes on a more serious aspect, with a mortality rate below 10 per cent and a morbidity period of about one and a half weeks. The complications are more serious. Here again, although our mortality statistics are complicated by the presence of many mongolian idiots dying of erysipelas, we feel ultraviolet therapy gives better results.

Infants under one year of age may be subdivided into trimesters. Roughly, those in the last trimester fare moderately well, those in the first two trimesters, poorly. It must be emphasized that, while serum therapy benefits the patients but slightly in the last trimester and not at all in the earlier months, ultraviolet gives good results in the second and third trimesters. Neither method of therapy seems to give any striking results in infants under three months of age, although individual cases at times seemed to respond well on ultraviolet irradiation. In more graphic terms, while erysipelas treated with serum is a highly fatal disease in patients under twelve months of age, erysipelas treated with ultraviolet is highly fatal under four months of age.*

Conclusions

1. Ultraviolet is superior to serum therapy in the treatment of infantile

* Thanks are due Drs. Bradner and Schneider of the physiotherapy division, to whom credit for the technical work must be given.

(*Concluded on page 781.*)

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Foreign Collaborators — OSCAR BERNHARD, M.D., *St. Moritz;* H. BORDIER, M.D., *Lyons;* ELKIN P. CUMBERBATCH, M.A., M.B., (Oxon) M.R.C.D., *London;* A. R. FRIEL, M.A., M.D., (Univ. Dub.), F.R.C.S.I., *London;* SIR HENRY GAUVAIN, M.D., M.Ch., *Alton, Eng.;* F. HOWARD HUMPHRIS, M.D., (Brux.), F.R.C.P., (Edin.), D.M.R. and E. (Camb.); MOREL KAHN, M.D., *Paris;* JOSEF KOWARSCHIK, M.D., *Vienna;* FRANZ NAGELSCHMIDT, M.D., *Manchester, Eng.;* A. ROLLIER, M.D., *Leysin;* CARL SONNE, M.D., *Copenhagen;* ALBERT E. STEIN, M.D., *Wiesbaden.*

EDITORIALS

SEASONAL AND OFFICIAL GREETINGS

The editor and collaborating staff of the Archives embrace the occasion of the Yuletide and approaching New Year to extend to the members of the Congress and readers the compliments of the season. It is with a sense of keen pleasure that we present at this time the informal greetings by the President and the President-elect of the American Medical Association as well as the seasonal greetings of the President of the American Congress of Physical Therapy. It may not be amiss to point out that the addresses by Drs. Upham and Abell, President and President-elect respectively, of the American Medical Association were delivered at the banquet held during the sixteenth annual session at Cincinnati, whose opinions are welcome and valued. These addresses are here presented in abstract style.

GREETINGS FROM THE AMERICAN MEDICAL ASSOCIATION

J. H. J. Upham, M. D., President

It is a very great pleasure to bring to you the greetings and best wishes of the American Medical Association. You represent at present one of our youngest specialties in practice, yet actually you are one of the oldest. When we look back to the times of primitive medicine and consider the practices of the priests on the Island of Cos, with the temples in the sacred groves located about the thermal springs, we see physical therapy in its historically earliest application. There the patients were placed on simple diets, bathed in the hot and cold springs, and rubbed with sacred oils, often with results far superior to the crude medical practice of the times. Unfortunately the gods were given most of the credit for the benefits resulting and so on down through the centuries superstition and ignorance completely veiled the rec-

ognition of the value of these simple means of treatment. Many of the most ordinary phenomena of nature could not be explained and therefore were considered supernatural. Disease was an affliction of the gods and mysterious methods and magic drugs were sought as the main hope for cures. During the last century hydrotherapy and massage began attracting attention, but it was not until the last two or three decades that we have come to a real appreciation of the value of scientific physical therapy. The progress in these relatively few years has been to me most gratifying. As dean of a medical college I have endeavored to keep informed of the general progress in the various fields of medicine, but after reviewing the program of this meeting, hearing some of the discussions and above all witnessing in your scientific exhibit the definite proofs of accomplishments of physical therapy as now practiced, I must confess to amazement and admiration.

I feel that you are our greatest reply to the pseudo-scientific drugless cults, and that had we appreciated the importance of this field and started in this line fifty years ago, there might not be the problems existing at present with such cult practices.

I am sure that you all appreciate the interest and cordial support of the American Medical Association in this therapeutic field. The Council on Physical Therapy has rendered splendid service in studying and evaluating the new forms of apparatus, I feel that you can count on our continued interest in and support of the scientific spirit and the high plane of practice manifested in your meeting here in Cincinnati.

THE AMERICAN CONGRESS OF PHYSICAL THERAPY

Irwin Abell, M.D.

President-Elect, American Medical Association

I am thankful for and appreciative of your courtesy in extending to me the privilege of being your guest this evening. So far in my experience as president-elect of the American Medical Association this invitation has been unique because I am not required to make a formal address. I wish to express to the members of this Congress the appreciation of the profession for what they have done and are doing in placing the practice of physical therapy upon a safe, sound, scientific and ethical basis. It is within the knowledge of everyone here that regardless of the advances made in science, charlatans have ever been ready to adopt a new discovery in personal exploitation for financial gain. This has been true especially of electricity, radium, ultraviolet light, and other methods of administering physical therapy. The abuses in this field became so flagrant that in 1925 the House of Delegates of the American Medical Association instructed the Board of Trustees to appoint a Council on non-medical agents whose duty it was scientifically to investigate and report on the value of all concerned apparatus and contrivances offered for sale to physicians and hospitals. Pursuant to those instructions the Council on Physical Therapy came into existence with the primary purpose of gathering and disseminating such information as will assist the medical profession in determining the therapeutic value of certain devices and methods employed in the administration of physical therapy and of protecting both the public and the conscientious manufacturer against fraud and misrepresentation. The Council consists of

clinicians, physicists, physiologists, pathologists, radiologists and surgeons, each a specialist in his particular field. Reports of its investigations are made in the Journal: articles sponsored by it are published in the Journal clearly setting forth the known merits of physical therapy and its agents. In a large measure it has been through the efforts of the Council that physical therapy has been freed of the unwarranted claims and the absurd theories with which in its earlier development it was burdened. Each year, each month, one might almost say each day, sees an ever widening field for its employment with a constantly growing fund of information regarding its effects. In fact, the accumulation of information is disproportionate to its dissemination and brings to the fore the problems of adequate undergraduate instruction, graduate teaching and the training of technicians. The American Congress of Physical Therapy is to be congratulated for the work it is doing in focusing the attention of the graduate on this branch of therapy and upon its contribution to the common fund of knowledge from which all may draw. And finally it becomes my pleasure to assure you of the sympathetic cooperation of the American Medical Association in all measures that seek to promote the art and science of physical therapy, to the principles of which your organization is dedicated and in the elucidation of which you have done so much.

SEASONAL GREETINGS

Frederick L. Wahrer, M.D.

President, American Congress of Physical Therapy

At this annual season of good will when men pause in their labors to observe in a material as well as spiritual way the amenities aimed at strengthening bonds of friendship and affection with one's kith and kin, it is a pleasure to extend my heartfelt greetings and good wishes to the members of the Congress and the readers of the ARCHIVES.

With two continents of the world in a political turmoil that leaves the unfortunate inhabitants in a state of fear and trepidation, we in America, while not absolutely secure in our peace, are at least at some distance from the seats of machinations by the powers that be, and can for the time being devote our energies to pursuits with the goal of adding to the sum total of human happiness. Yet, one must not forget that oceans are no longer formidable barriers against hostile raids in some form, and proof is not wanting that there are neighboring peoples with whom we have no quarrel, who have already sent out advance forces to surreptitiously undermine our social fabric and to disintegrate our national sovereignty for their own selfish and nefarious purposes. At such time our leaders cannot even at this season remain content with mere phrases of good will, but must caution our people to do their full duty by devotion to our old ideals and by remaining on guard against the subtle influences which may well be labeled: human intolerance, economic greed and national negalomania.

To us as physicians our duty is clear. While enjoying for the moment the festive spirit which among civilized peoples is scrupulously observed even in war, we must not relax in our efforts to develop the sciences in which we are engaged as practitioners or workers. Achievement of any kind by individuals means also national achievement. While each of us is entitled to that reward which is due for sincere and fruitful effort, we must not

neglect to share our responsibility as citizens of a country, which is the envy of others for its spiritual and material attainments. I have no doubt that the men and women of our specialistic group will fulfill their professional obligations and their duties as American citizens. It is my hope and wish that peace and good will may prevail long after the present season, and at the same time to convey the thought that our future will be bright if we maintain the proper spirit of humanitarianism, as I am sure we all will. In this sense I close with the words: A Merry Christmas and a Happy New Year to all.

THE SEVENTEENTH ANNUAL SESSION
IMPORTANT ANNOUNCEMENT

After careful consideration of all concerned factors the Program Committee and the Executive Council of the American Congress of Physical Therapy have selected Chicago for the next annual session to be held September 12, 13, 14 and 15, 1938, in the Palmer House. The committees feel that this selection is to the best interests of the membership of the Congress. Chicago is too well known as an important medical center to require discussion. Apart from its resources of a scientific nature it contains the central offices of the Congress and of its official publication which circumstance will facilitate the completion of the complicated arrangements incident to scientific conventions, calculated to afford the members, their families and visitors the means of deriving the greatest possible benefit from attendance.

The vast scientific resources of Chicago's seats of learning and hospitals have been placed at the disposal of the Congress, so that the 1938 session promises to become an outstanding one in its history.

Of many special features planned for that session we announce a predominantly clinical course of instruction in physical medicine to be held September 7, 8, 9, 10 immediately preceding the annual session proper. This course will be given by teachers of physical therapy in medical colleges. While the clinical aspect will be stressed, theoretic fundamentals will be presented didactically with the usual means of visual as well as auditory instruction. While this course is primarily intended for physicians, a limited number of technicians properly vouched for will be accommodated.

The success and appreciation shown of the scientific exhibits, notably that of 1937, have prompted the convention committee to arrange for an even greater one for the coming session. Ample space and facilities are available, but it is in the interest of the exhibitors as well as the committee of arrangements to make early reservations.

For the scientific program every effort will be made to secure the participation of outstanding specialists in the field of physical medicine and the allied sciences. A series of special clinical conferences will be equipped for demonstrations by drawings, lantern slides and moving pictures. Many clinics will be thrown open to our members, each providing ample and interesting material for observation and study.

Other features will be announced from time to time, while the complete program for the pre-session course of instruction will be published during the coming spring.

Correspondence

Therapeutic Possibilities of Low Intensity Short Wave Treatment

To the Editor:

Some additional views regarding the most effective means by which short wave therapy may be administered, will possibly appeal to those readers who are interested in the subject. This branch of physical therapy, requires, of course, no introduction to most medical practitioners, since it is, by this time, moderately well known and seems to have quickly taken its rightful place as one of the most powerful therapeutic weapons at our disposal.

Although scientific opinion nowadays appears to favor the simple condenser field when the most generally useful single method of applying the treatment is being considered, it has recently been noticed that among the patients presenting themselves at times during the conduct of practice, some conditions are encountered, which, although not entirely unresponsive to the ordinary condenser therapy are, nevertheless, more favorably influenced when electromagnetic or short hertzian waves are also applied.

Those cases responding to the combined method include certain types of osteoarthritis, rheumatoid arthritis, nephritis, vertebral inflammation, pulmonary disease, etc. In fact, many other lesions, which only improve slowly when either condenser or cable induction are applied, derive benefit from the additional method under consideration.

The electromagnetic or space radiation was originally obtained from a low intensity short wave therapy unit, of the type successfully used by Weissenberg. It was found to be moderately satisfactory, but even better results were secured with a larger circuit constructed so as to emit this radiation in greater quantity.

Clinical results of the combined form of treatment are very gratifying, perhaps one of the greatest advantages being the ease of withdrawal of either of the constituents. Thus the electromagnetic element can be instantly taken away or switched off, leaving the condenser field in sole action, or the converse arrangement may be adopted when the effect of the space waves only is required.

The earlier experimental work was performed with two separate units. Later a dual type of apparatus was constructed, which incorporated both modalities in the one instrument, thus affording the advantages of condenser field and hertzian wave, either in combination or separately. This unique form of generator appears to be extremely successful, and its production is regarded as constituting yet another step forward in the progressive science of short wave therapy.

It is, perhaps, almost unnecessary to add that the investigation is still proceeding, and that the volume of evidence is accumulating daily. We hope, therefore, that we will be able, in the near future, to place before your readers, some more convincing details concerning the response of patients who are at present undergoing treatment.

Yours faithfully,

K. R. Speeding, M.B., B.S. (Melbourne), Diploma of Radiology (Edinburgh).
61 Collins Street.

Ultraviolet Irradiation of Erysipelas — Starr

(*Continued from page 776.*)

erysipelas. In our series, serum therapy has no effect on the mortality rate in infants.

2. For effective irradiation large dosage must be employed.

3. Infants from one to two years of age may receive ultraviolet alone with good results.

4. Infants from four to twelve months of age must receive ultraviolet to achieve best results. Serum, although of little benefit, may be used in addition.

5. Infants under four months of age must receive both forms of therapy along with early and repeated transfusions in an effort to combat the disease.

341 East 19 Street.

Reference

1. Nightingale L., and Starr, S.: Treatment of Erysipelas in Children, J. A. M. A. 102:761 (Mar. 10) 1934.

THE STUDENT'S LIBRARY

THE PATIENT AND THE WEATHER. By *William F. Petersen*, M.D. With the Assistance of *Margaret E. Milliken*, S.M. Vol. II, *Autonomic Disintegration;* Vol. III, *Mental and Nervous Diseases;* Vol. IV, Part 1, *Organic Disease*, Cardio-Vascular-Renal Disease including a chapter on Experimental Endocarditis by *Alexander J. Nedzel*, M.D. Cloth. Pp. (Vol. II) 530; (Vol. III) 375; (Vol. IV) 663 with illustrations. Price $6.50, $5.00, and $10.00 respectively. Ann Arbor, Michigan: Edward Brothers, Inc., 1934, 1934, and 1937.

These highly informative and stimulating contributions of Petersen will appeal to all progressive physicians who have long appreciated the brilliant and revolutionary labors of past and contemporary members of the profession. The tremendous scope of his work together with its sweeping implications and conclusions is a challenge and a stimulant to critically evaluate the organized information that supports some of the neglected teachings of Hippocrates. As already pointed out in past reviews, Petersen brings to these pages a mastery of perfect English — stylistically fluent, fluid, vivid — that does full justice and credit to the scientific facts introduced therein. The author's *leitmotif* is his emphasis on the complexity of environmental factors influencing such an intricate mechanism as the human body. This is expressed in the full force of its importance for diagnosis and therapy. The responsiveness of the individual to his environment — meteorological, seasonal, and geographical — is pointed out by Hippocrates and re-emphasized by voluminous facts by the author to demonstrate the changes in the bio-physical structure due to stimulation, over-stimulation, and fatigue leading to pathologic changes and death. The living organism becomes a cosmic resonator which must adapt itself to the rhythm of seasonal and environmental conditions, which in turn enhance or reduce its adjustability and lead to certain metabolic and chemical manifestations grouped into symptomatic entities or disease. This is related to conditions associated with autonomic disintegration, such as lack of oxygenation and vascularization of tissues, focal, systemic and endocrinic manifestations which are classified as headaches, migraine, epilepsy, eclampsia, colitis, ulcers, neuroses, skin lesions, and organic changes related to mental and nervous diseases. From a therapeutic point of view, prevention and stabilization of the forces operating to produce these conditions are of prime importance. The chapter on "therapeutic implications" must be read to be fully appreciated. The books are replete with charts, footnotes, and bibliographic data as a guide to the better understanding of the exposition. Part 1 of volume IV deals with influences of environment on organic diseases of a cardio-vascular-renal nature, and an experimental study by Professor Nedzel on endocarditis. Here as in the above discussed books Petersen points out the distinct influence of weather, season and barographic changes on the health of the patient. His extensive preface forms a most stimulating and erudite introduction to the discussions. The first case report brings home the relationship of changing weather conditions in connection with the death of a noted Chicago banker, who was ushered into immortality against the unavailable efforts of a formidable group of leading Chicago physicians. Interesting are the graphs pointing out the tide and rhythm of the relapses suffered by this distinguished patient and their parallel to the polar episodes and barographic changes. From what has been said it is evident that these volumes contain information of such high value that they must be read by every progressive physician and student of modern medicine.

SHORT WAVE DIATHERMY. By *Tibor de Cholnoky*, M.D., Associate in Surgery, New York Post-Graduate Medical School. Cloth. Pp. 310 with 38 illustrations. Price $4.00. New York and London: Columbia University Press, Columbia University and Oxford University Press, 1937.

Thermogenic agencies have from time immemorial played an important role in the relief of painful symptoms and restoration of function. Every new contribution in this field of therapy has therefore been hailed with renewed hope according to its appeal to one's imagination and the promise of its superior efficacy to influence pathologic structures. Out of the welter of this experience has emerged definite scientific information in contrast with many vagaries that had as their basis certain concepts of the physiologic processes invoked and the clinical effects obtained from use of heat producing agents. With the advent of short wave diathermy the profession has avoided enthusiastic trends along empirical paths and attempted to evaluate this new innovation in thermogenesis by methods acceptable to science. De Cholnoky has rendered a definite service by reviewing the extensive literature on the subject, about 750 publications in the field, bringing down to date the essential facts and conclusions as well as indicating the trends and developments in this field of therapy His thesis is divided into six parts. The first provides a fairly comprehensive historical introduction to the evolution of short wave diathermy. The second part explains the physical fundamentals for those uninitiated with the technical background of short wave transmission for medical purposes. This section is unfortunately the least informative part of the work. It is too sketchy for practical application and perhaps too elementary for those wishing more detailed data. It may be likened to the half-way house between substance and obscurity, from which no profitable experience can be derived. This is in con-

trast with the succeeding sections wherein is reviewed and evaluated the experimental evidence of the action of short waves on living and phantom material, their mechanical principles and technic of application for clinical purposes, and the conclusions drawn from the voluminous literature contributed on the subject. De Cholnoky has endeavored to clarify this by organizing the material within the space of a single volume. It is shown that short wave diathermy offers significant therapeutic possibilities even though certain theories are still questioned because of disputes regarding the basic action and nature of these electric radiations. It is a critical review, conservative but also tolerant in its estimation of the present and future development of short wave diathermy. For this reason it can be recommended for general and special practitioners as one of the most informative contributions on the subject.

CREATIVE CAMERA ART. By Dr. *Max Thorek*, F.R.P.S., F.R.S.A., etc. President, Photographic Society of America, etc. Boards. Pp. 156 with 59 illustrations. Price $3.75. Canton, Ohio: Fomo Publishing Company, 1937.

During every clock-beat through which humanity has existed and struggled for a better understanding of his world and the things about him, man has often attempted to express his spiritual and esthetic emotions through the creative channels of rime or song, or by the magic of color, carving or the written word. In awed silence and solitude the human mind has contemplated the stars above and beauty of nature around it and lifted voice in humility or in ecstacy to inquire as did the Psalmist, David, of his Creator, "What is man, that thou art mindful of him, and the son of man, that thou visitest him?" Generically, the medical profession has contributed many talented members to this selected guild who through their avocation, and its cultivation, brought fame to themselves and reflected distinction to their calling. The names of these are legion, and they have left an inspirational trail for future members to emulate or surpass. It is therefore gratifying though not surprising to note that the above volume on *Creative Camera Art* is the contribution of a busy surgeon who has long wielded the scalpel with no small distinction, but found time to develop an appreciation for trees in their blooming, tides in their flowing, stars in their circling that tremble with song. Not only has Thorek captured the song and poesy of the inanimate but what is of greater interest, the delicate shadings and emotjons of the animate and its supreme product — man. The book is a pictorial exposition in photographic art based upon assiduous labor, creative effort and personal convictions founded on critical observation and study. It embodies his opinions, — a philosophy of photography as an art — written in a clear, energetic and informative manner. The large number and variety of portraits and prints in the text richly illustrate the author's point of view, his technic and his artistic license by means of which he pictorializes rather than symbolizes an object. His artistry is creative: vital without being florid, tonal in its contrasting shadows without suggesting metaphysical impressionism. The work is authoritative in content and is a contribution that adds to the cultural assets of the medical profession.

METHODS OF TREATMENT. By *Logan Clendening*, M.D, Clinical Professor of Medicine, Medical Department of the University of Kansas; Attending Physician, Kansas City General Hospital; Physician to St. Luke's Hospital, Kansas City, Missouri. With Chapters on Special Subjects by *H. C. Anderson*, and others. Fifth Edition. Cloth. Pp. 879, with 102 illustrations. Price $10.00. St. Louis: C. V. Mosby Company, 1935.

This book was planned to furnish an outline of all the methods of treatment in internal medicine. The author's aim has been to describe each method of procedure so clearly and minutely that a person who has never seen it performed could do it from the description. This fifth revision is the most thorough that has been made since the book was first set up. While no change has been found in the general plan, each chapter has been carefully scrutinized. Several of the chapters have been written by specialists in their respective fields. The work is repetiprehensive in nature and well illustrated. It should prove of real value in every medical library.

PROCTOLOGY. A Treatise on the Malformation, Injuries and Diseases of the Rectum, Anus and Pelvis. By *Frank C. Yeoman*, A.B., M.D., etc., Professor of Proctology, New York Polyclinic Medical School, etc., etc. Second Edition. Cloth. Pp. 661 with 421 illustrations and 4 color plates. Price $12.00. New York and London: D. Appleton-Century Company, 1936.

The second edition of Yeoman's work comes fully vouched for as having incorporated the latest advances in this field of treatment. The book has therefore been materially revised by such changes and additions as to make it a representative work on proctology. At least fifteen notable topics have had the benefit of changes representing the latest opinion on the subject. Physical therapy procedures have not been accorded similar benefits due no doubt to lack of appreciation of its special value in this field of practice. Turning to the management of hemorrhoids one notes that the author justly criticizes a certain technic of positive galvanotherapy as a substitute for more proven and practical methods of treatment. One is surprised to note that no mention has been made of the brilliant effects of negative galvanism, a method of proven value in ambulatory practice. The author jousts with technics long discarded and discredited, but offers no substitute except injection or operation. In the light of present knowledge the exposition of this part of the subject could well stand material revision of a practical nature. Nor has the author pointed out the most recent advances, value and differences between thermogenic sources, such as short wave therapy, diathermy and infra-red as a supportive or specific method in a large variety of rectal symptoms. The author has not fully taken advantage of his opportunity when he loosely evaluates discarded

technics of galvanism and thermotherapy of the housewife variety. Outside of the above objections the present edition is both impressive in size and text, and summarizes the conservative opinions and procedures in modern proctology.

DIE OPERATIVE BEHANDLUNG DER FRISCHEN MEDIALEN SCHENKELHALS-FRAKTUR. (Operative Treatment of Recent Medial Fracture of the Neck of the Femur.) Von Dr. *Fritz Felsenreich*, Assistant II. Surgical University Clinic in Vienna. Cloth. Pp. 200 with 279 illustrations. Price: Rm. 15.00. Vienna: Wilhelm Maudrich (American Agency: Chicago Medical Book Co., Chicago), 1937.

All surgeons, orthopedists and general practitioners who have had any experience with fractures of the neck of the femur especially in elderly individuals know that this type of injury presents a serious problem, which not infrequently has been echoed in our courts of record as damage suits. The unsatisfactory results obtained in many instances no matter what method of treatment has been followed, operative or conservative, render this authoritative manual or rather text-book a welcome addition to the literature on fractures. Under the direction of Professor Denk, head of the II. Vienna surgical university clinic, the author has not only been in a position to try out the surgical management of the type of fracture dealt with in the book, but to make important comparative studies which enabled him to take a decided stand against such authors who in a spirit of pessimism have rejected the wiring or nailing of the femur when fractured medially. The author has succeeded in writing a fairly sized volume and to present so many illustrations when even in large text-books this single type of fracture is ordinarily disposed of in a few pages. Space forbids even an enumeration of the subject titles let alone their discussion. It must suffice here to say that after a brief history the author devotes 58 pages to preparation of the patient, the individual operative steps and postoperative care. Not the minutest detail has been overlooked, so that any one familiar with "nailing" of fractured bones will be able to apply the technic as described and richly illustrated without the need of watching the steps by other surgeons. In the second part of 100 pages Felsenreich discusses the course taken by complicated fractures. The last part of the book is devoted to an illuminating study of the various therapeutic results. In this part the reader is afforded an opportunity critically to weigh the advantages and disadvantages of the diverse methods of management, both with regard to early and late results. The causes of bad results are discussed frankly. This valuable book concludes with a description of a simplified instrument facilitating the introduction of wire nails. The format of the book and the illustrations leave nothing to be desired. There is an extensive bibliography, but no index. The table of contents is adequate for finding any desired subject. This book is indispensable to any practitioner interested in the treatment of fractures in general and of those of the neck of the femur in particular.

ELEMENTS OF ORTHOPEDIC SURGERY. By *N. Ross Smith*, M.B., Ch.M. (Sydney), F.R.C.S. (Eng.); Orthopedic Surgery, Cornelia Hospital, Formerly Surgical Registrar, West London Hospital, Surgical Registrar and Senior House Surgeon, Royal National Orthopedic Hospital, London; Demonstrator in Anatomy, University of Sydney. Foreword by *R. C. Elmslie*, O.B.E., M.S., F.R.C.S., Orthopedic Surgeon, St. Bartholomew's Hospital, Consulting Surgeon, Royal National Orthopedic Hospital, London; Past-President, British Orthopedic Association; Chairman of Council, Chartered Society of Massage and Medical Gymnastics. Cloth. Price, $4.00. Pp. 246 with 99 illustrations. Baltimore: William Wood & Company, 1937.

Elmslie in his foreword states that he believes physical education may be classed as a preventive side of orthopedics, and that the organization of orthopedic treatment has become a matter of considerable complication in England. Many individuals other than specialists are therefore concerned with this care. Some are members of the auxiliary profession of nursing, massage and appliance while others are laymen without any medical training. The aim of this book is to supply these auxiliary and lay groups a general idea of the objects and methods of orthopedic treatment. The more common conditions treated by orthopedic methods are described in a manner that can be easily understood by these groups, while rarer affections are omitted or merely mentioned in a few words. The appendix contains descriptions of physical therapy, splints, appliances and plaster-of-paris technic. This volume can be recommended to practitioners, students, nurses and laymen engaged in crippled welfare work who do not require the full knowledge given by the larger books.

INTERNATIONAL ABSTRACTS

Experiences With Short Waves. (Unsere Erfahrungen mit den Kurzwellen.) W. Haase.

Beit. z. klin. Chir. **164**:227 (Sept.) 1936.

The author classifies 3 large groups of indications: (1) circumscribed acute inflammations (not chronic ones) due to different exciting causes of suppuration, most generally of a commonplace character, (2) secondary and at times acute inflammation from various causes in the vicinity of some primary foci, and (3) conditions due to deficiency in the blood supply.

The author does not postpone a necessary operation, and continued to perform incisions.

Circumscribed inflammation classed in the first group is most suitable for the treatment (furuncles, carbuncles, abscesses, panaritis, inflammation of sweat glands, also phlegmon or erysipelas). The inflammation readily subsides; progress is arrested. The author includes also the good results obtained in gynecologic inflammation, suppuration of accessory cavities, abscess in roots of teeth and gonococcal arthritis.

To the second group pertain diseases which manifest inflammatory edema and resulting pain. It is highly important to submit such secondary acute deterioration to short wave treatment as soon as possible. In this group are placed inflammatory talipes valgus, overstrained limbs of sportsmen, irritation of the capsular ligament arthrosis deformans, due to overstrain, (arthritis deformans itself does not respond to the treatment), sciatica, lumbago, distortions and traumatic haematoma. The third group embraces diseases related to Raynaud's gangrene, frost-bites, acrocyanosis, if death of tissue has not occurred.

A New Incandescent Light Bath for Stiffness of the Shoulders, Induration of the Cervical Muscles and Related Conditions. (Ein neuer Glühlichtkasten für die Behandlung der Schulterversteifung, Muskelhärten in der Nackenmuskulatur und verwandter Zustände.) W. Thomsen.

Arch. f. orthop. u. Unfall-Chir. **36**:628 (Dec.) 1936.

With rheumatic diseases of the shoulders there is a morbid change, not merely of the deltoid but also of the scapular muscles especially the supraspinatus and the superior part of the trapezoid muscle. The men who constructed light baths up to now did not consider this type of affections. When the recumbent patient is covered with a light and hot air bath, the cervical and posterior scapular muscles are heated thoroughly while the anterior part of the deltoid muscle will not be affected at all or at least not sufficiently. A hot air bath over the abducted arm while the patient is sitting, heats merely the deltoid muscle, but does not supply sufficient heat to the posterior scapular muscles or to the superior part of the trapezoid muscle, though there annoying pains are often caused by palpable changes.

For that reason the author constructed a light-bath made to supply sufficient heat to all diseased muscles at the same time. It consists of a wooden box provided with an opening for the head at the superor front. The bottom side is open, too. The inside of the box is equipped with 25 globes of 10 watts, a padded splint preventing contact with the lamps, in the back, and two padded shields in front, movable by screws, serving the same purpose. The lamps are arranged in 3 compartments, one of which is placed in the right and the other in the left rounded side of the box. Five more are attached to the posterior wall of the box to be used for the cervical muscles. The lateral lamps form two groups with separate switches. By this separation a means is offered to treat both shoulders at the same time. As a special feature the apparatus is armed with a suspended device and counterweight, moved by chains running over pulleys at the ceiling. By that device the apparatus works easily up and down. It stops at any height automatically. The application is carried out in a manner that the patient is placed on a chair provided with movable arm supports. Then the apparatus is pulled down, and the lamps turned on. Regulation of heat is secured by turning on the different circuits. Single lamps may be turned off in the sockets. The output of electric power is considerably lower than with other light baths. Speedy improvement was achieved subjectively, while objectively the restricted movements were bettered.

Tonsillectomy vs. Electrocoagulation. Joseph D. Kelly.

New York State J. Med. **37**:263 (Feb.) 1937.

To the well-trained otolaryngologist, tonsillectomy is truly a surgical procedure. It may be a simple one in some and a very difficult one in other cases. The operation does not consist in the use of the Sluder snare, or any modification thereof, but means a careful dissection without the use of the instrument. It is a fallacy to believe that the experienced otolaryngologist is always stopping hemorrhages and running into complications, and that he does not have a large percentage of excellent surgical results. In the modern hospital, the up-to-date tonsillectomy is a fifteen to thirty minute operation including the time necessary to effect efficient analgesia, a complete enucleation with a minimum of trauma, a wholesome respect for tissue, and an orderly surgical

technic of hemostatsis. The patient will generally leave the operating room free from pain, but as the anesthetic wears off, there will be some discomfort, pain, and restlessness which can be controlled. He usually sleeps the best part of the night with an opiate and awakens the next morning to be helped by a warm throat irrigation, aspirin, anesthesin, and in eighty per cent of the cases, has orange juice, cereal, and coffee. About four per cent of tonsillectomies have postoperative bleeding, which generally is easily controlled either by plugging the fossa, re-injecting the area with novocain, checking the bleeding point, or putting in a suture. Bleeding in local cases usually occurs within six to twelve hours. Bleeding in electrocoagulation takes place before the fifteenth day and then the induration and sloughing make it practically impossible to locate the bleeding point, and any attempt to put in a suture is followed by more hemorrhage, which can be controlled only by pressure.

Electrocoagulation of the tonsil requires 15 to 20 visits to the office at weekly intervals, each application is followed by sore throat which lasts 24 to 48 hours with intermittent bleeding and possible pain in the ear. The mental effect on some of the thinking, intelligent people who have accepted a course of this treatment is bad. Some require a sedative before each ordeal and others become so disgusted that they have the tonsils removed by surgery rather than go for the remaining treatments. All had pain and bleeding. One patient was in the hospital twice with hemorrhage.

Electrocoagulation for the removal of tonsils should play a very small part, and it should be used in the procedure for which it is best suited — that is, as a general cautery for the removal of lymphoid tissue at the base of the tongue, on the pharynx, on the nasal pharynx, or at the base of the tonsil, and for the shrinking of the turbinates.

Short Waves in Spastic Vascular Diseases. (Über die Anwendung und Erfolge der Kurzwellen bei spastischen Gefässerkrankungen.) H. Galm.

Beit. z. klin. Chir. **164**:235 (Sept.) 1936.

From animal experimentation the statement was made, that ultra-short waves exert a direct influence on the sympathetic nerve in the way of lowering the sympathetic tonus. Irritation of the vagus took place at the same time. Dilatation is produced mainly of the arterial side of the capillary vessels, which persists for some time. Spastic diseases of blood vessels were healed clinically.

On the basis of these experiences the author applied short waves in 3 cases of Raynaud's gangrene by exposing the abdominal sympathetic ganglia to short waves. The results, including microscopic observations at the capillary vessels, revealed that the first two cases were cured, while the last showed decided improvement was achieved. Such results are encouraging and the treatment should be administered before resorting to radical amputations and to resection of the sympathetic nerve.

X-Ray Treatment of Extensive Periarthritis of the Knee. (Über die Röntgenbehandlung der extensiven Periarthritis des Kniegelenks). G. Huc and P. Aimé.

Strahlentherapie **57**:270 (Oct.) 1936.

The authors describe the method they used in chronic arthritis of the knee. They term the picture the disease presents "periarthritis," owing to the fact that in the primary stage nearly all symptoms were extra-articular, namely, (1), pains due to pressure at the border; (2), inflammation of cellular tissue, and (3), raised temperature at the medical side of the knee joint, while the synovia is affected only secondarily. As local therapy, rest, massage, baths and heat have been applied for a long time. Though therapeutic success was achieved, still, from a social point of view, these remedies present difficulties of employment. That is why search is made for a new method. In the author's opinion the simplest, the most reliable and the most effective remedy is x-ray treatment. The author based it on the destructive effect of the x-rays on the cells of new hyperplastic tissues, no matter whether or not they are connective, vascular, fatty, or osteophytic in nature. Considering the elective effect of the x-rays on new cells, the dosage must be in inverse ratio to the seriousness of the disease. In a knee-joint revealing slight hyperplasia of the connective tissue a relatively higher dosage will be required than in advanced arthritis deformans. In the latter case there is more new tissue present, which assures a better and more lasting reaction.

The authors begin with 75-123r and gradually increase the strength to 200-250r. Only one field is covered by one exposure. The knee is treated in 4 fields, two lateral ones, one anteriorly and one posteriorly. The entire dosage amounts to 1500 : 2700r, i. e., 375-675r per field. Generally a dosage of 1900r is sufficient to heal traumatic periarthritis. Irradiation is applied with a filter of 0.5 mm. Cu. + 1 mm. Al or of 1 mm. Cu. + 1 mm. Al. The distance of focus from the skin is 30-40 cm. The dosage is determined with Salomon's gonometer. An average course of treatment requires 3-4 weeks. The number of treatments should be not less than 7 and not more than twelve. As a rule, one course of treatment is sufficient as improvement often becomes manifest at the fourth exposure. With the exception of tuberculous osteoarthritis which presents a contraindication to this treatment, the authors obtained improvement in nearly all cases of arthritis. Along with orthopedic measures the treatment described is indicated for all mechanic diseases of the joints (traumatic, static types, and arthritis due to occupational strain), but inadequate in the presence of small foci or bone necrosis. Such types which are due to bacterial or toxic lesions require in addition to irradiation vaccines, chemotherapy, or operative intervention. Complete rest of the joint is not advocated, to avoid disuse of the musculature of the joints.

"... it is recommended that all physical therapy technicians in approved hospitals have a certificate from the American Registry of Physical Therapy Technicians."

Quoted from HOSPITALS, The Journal of The American Hospital Association.

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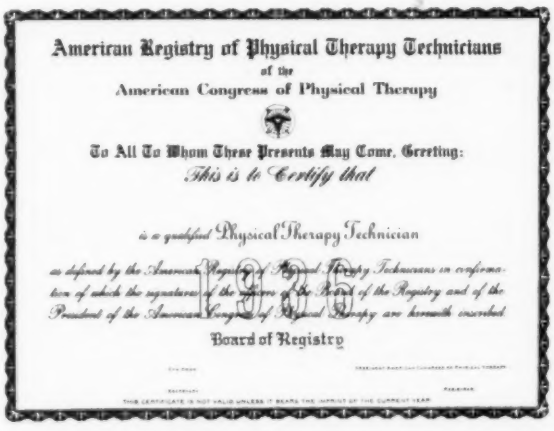

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●

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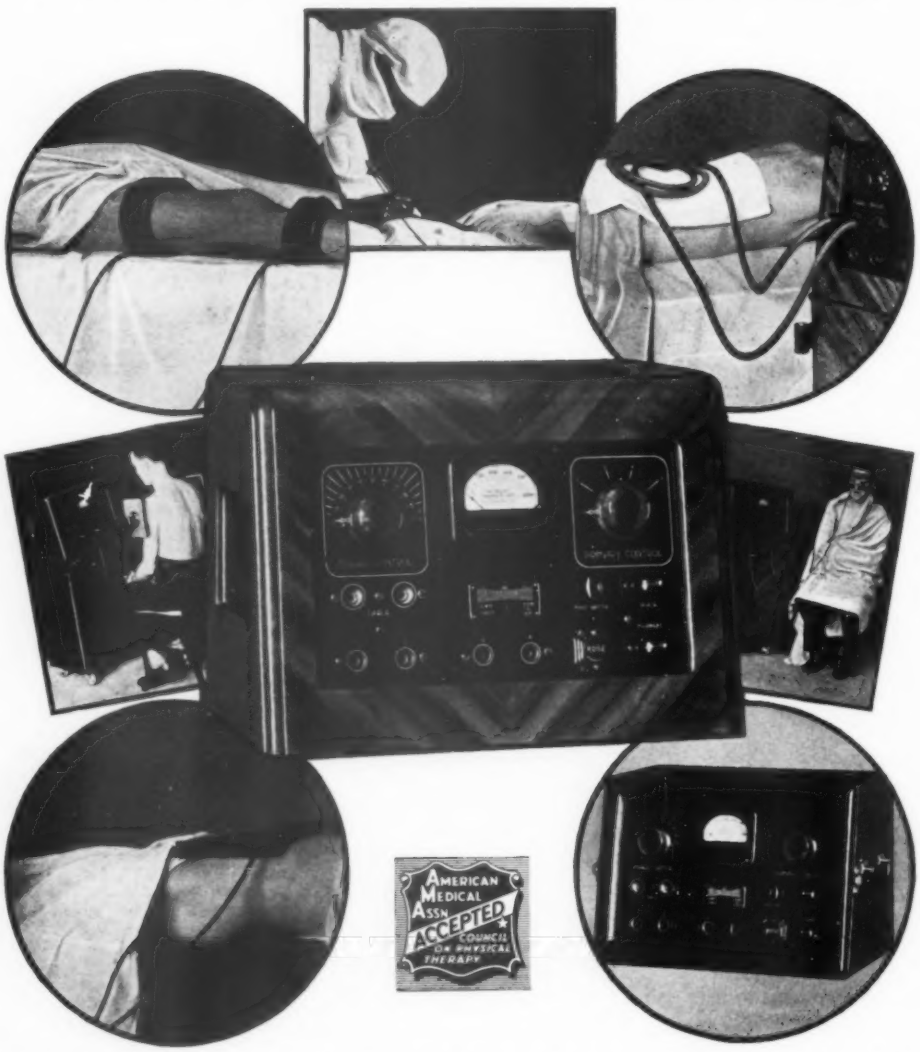

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